United States Court of Appeals
for the
District of Columbia Circuit

TRANSCRIPT OF RECORD

BRIEF FOR APPELLANTS AND APPENDIX

IN THE

United States Court of Appeals

DISTRICT OF COLUMBIA

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA

FILED DEC 13 1944

Joseph W. Stewart

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604

No. 8851

LEONARD VALVE COMPANY AND FREDERICK C. LEONARD, *Appellants,*

v.

CONWAY P. COE, COMMISSIONER OF PATENTS, *Appellee.*

Appeal from the District Court of the United States for the District of Columbia.

NATHANIEL FRUCHT,
1023 Hospital Trust Bldg.,
Providence 3, R. I.,
Attorney for Appellants.

KARL FENNING,
Of Counsel.

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INDEX TO BRIEF.

Page
Parties and Proceedings.......................... 1
Statement of the Case.......................... 2
The Statutes Involved.......................... 2
Statement of Points.......................... 2
Summary of Argument.......................... 3
Argument.......................... 3
  I. General Statement.......................... 3
  II. The Claims in Suit.......................... 5
  III. The Evidence Before the District Court....... 7
  IV. The Decision of the District Court............ 10
  V. Argument.......................... 10

CITATIONS.

Consol. Valve Co. v. Crosby Valve Co., 113 U. S. 157... 13
Hobbs v. Beach, 180 U. S. 383...................... 14
Topliff v. Topliff, 145 U. S. 156...................... 14

IN THE

United States Court of Appeals

DISTRICT OF COLUMBIA.

Appeal No. 8851.

LEONARD VALVE COMPANY and FREDERICK C. LEONARD, *Appellants,*

v.

CONWAY P. COE, COMMISSIONER OF PATENTS, *Defendant.*

Appeal from the District Court of the United States for the District of Columbia.

BRIEF ON BEHALF OF APPELLANTS.

PARTIES AND PROCEEDINGS.

This is an appeal from the decree of the District Court of the United States for the District of Columbia, dismissing the plaintiff's bill under R. S. 4915 to procure a patent on an application Serial No. 362,045 entitled Thermostatic Mixing Valve, filed October 21, 1940, by the plaintiff Frederick C. Leonard and duly assigned to the plaintiff Leonard Valve Company, the assignment being duly recorded in the

United States Patent Office. Jurisdiction is founded in Revised Statutes 4915.

STATEMENT OF THE CASE.

The Bill of Complaint is in the usual form under Revised Statutes 4915 and demands adjudication that the plaintiffs are entitled to a patent and that the Commissioner of Patents be directed to issue a patent to the plaintiffs.

Claims 11 to 15 of the application were specified in the Bill of Complaint, but the plaintiffs withdrew as to Claims 13, 14 and 15.

Claims 11 and 12 are therefore in suit. The answer asserts that the claims are unpatentable in view of the following prior art patents.

Leonard	2,175,203	Oct. 10, 1939
Leonard	2,110,884	Mar. 15, 1938
Leonard	1,957,276	May 1, 1934
Johnson	1,127,627	Feb. 9, 1915
Young	2,122,600	July 5, 1938
Henneuse	1,845,499	Feb. 16, 1932
Kenney	1,980,624	Nov. 13, 1934

THE STATUTES INVOLVED.

The suit is brought under Revised Statutes 4915, and the plaintiffs contend that they are entitled to a patent under Revised Statutes 4886 as amended.

STATEMENT OF POINTS.

The District Court held the claims in suit invalid for lack of invention, and entered a decree dismissing the bill.

The title to the patents in suit is not contested.

The following, then, is the only question presented for decision.

1. Is the Leonard valve, as defined in Claims 11 and 12 in suit, a new and useful invention?

The plaintiffs assert that it is.

SUMMARY OF ARGUMENT.

The Leonard invention relates to a thermostatic valve construction, which receives large volumes of hot and cold water, and thermostatically controls the proportions admitted, so that the outflowing mixed fluid has definite, regulatable temperature.

There is literally no anticipation of the claims in any of the prior art patents cited by the defendant. The specific construction of the Leonard Valve are not disclosed in the prior art; no one had ever made a thermostatic valve for a stream of water of fire hose volume; no one had ever determined exactly what arrangement of parts was necessary to obtain an accurate regulation of the temperature of the outflowing water for such a large capacity.

Small thermostatic valves had long been known, suitable for shower use; but never had there been a valve devised capable of setting to obtain a desired temperature for an immense stream of water. The prior art never solved this problem; the plaintiff Leonard did, and his large capacity valves are now in extended use.

ARGUMENT.

I.

General Statement.

The appellant Leonard is the inventor of an improvement in a thermostatic mixing valve, for which an application for United States Letters Patent No. 362,045 was duly filed Oct. 21, 1940 in the United States Patent Office. The appellant Leonard Valve Company is the assignee of the invention and the application.

The application relates to a thermostatic mixing valve and is specific to a novel construction designed for very large flow capacities as compared to small valves used for shower baths and the like, the flow capacity being specified as being 10,000 gallons per hour (App. p. 82), which capacity is about the same as that of a large fire and finds especial use in laundries.

The drawings of the application disclose a valve body 10, 11 with inlet 14 for hot water and an inlet 15 for cold water. The inflow streams of water enter a tubular valve seat which has a central partition 22, and a series of annularly disposed flow ports 23 and 24 for the hot and cold water which are closely adjacent the partition. A tubular slide valve 26 is mounted over the tubular valve seat and has two large centrally disposed passageways or openings 27 which are wide enough to extend over the hot and cold water ports 23 and 24, the hot and cold water passing through these large openings 27 in separate adjacent streams into the valve body 10, 11 and mixing therein while flowing directly to the outlet 54, which is shown as being directly over the flow ports. The flow of the hot and cold fluids is thus a direct flow from the tubular valve seat through the ports 23, 24 of the valve seat, through the large ports 27 of the valve, and directly out through the outlet 54.

Control of the temperature of the outflow fluid is obtained by sliding the valve 26 so as to extend over one set of ports, for example the hot water ports 23, thus reducing the amount of hot water, while at the same time the cold water ports 24 are opened up so that more cold water passes out through the ports 24; the reverse procedure is accomplished if the temperature of the outflowing fluid becomes too cold and more hot water and less cold water is needed.

The sliding movement of the control valve 26 is accomplished by means of a bi-metallic thermostat 40, which is in the form of a spiral coil made up of two metals having different rates of expansion under heating changes, one end of the coil being regulatably fixed, while the other end of the coil is connected by means of a ball and socket joint with the control valve, so that as the temperature of the mixed fluid changes, the coil opens and shuts and moves the control valve to regulate the relative amounts of hot and cold water which are allowed to pass through.

The above described action is broadly the same action as is used in small shower bath valves, such as for example shown in applicant's prior Patent No. 2,175,203, which is a thermostatic valve for shower bath use. However, the change-over to a very large capacity valve which can control a flow such as is obtained in a fire hose, requires a change in the relation of the operating parts which is not obvious or apparent and which required a very large amount of experimentation and the application of inventive ability, as will hereinafter appear.

II.

The Claims in Suit.

Claims 11 and 12, the only claims in issue in this appeal, are presented herewith:

> 11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a themostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.
>
> 12. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with

> the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; the ends of said valve being tapered, said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

Considering Claim 11, the following structural features are defined in the claim:

1. The entire valve body is the mixing chamber.
2. The tubular element for the hot and cold fluids has its flow ports *closely adjacent* the partition.
3. The sliding valve has its port openings centrally positioned and extending over both sets of hot and cold water openings.
4. The thermostat which controls the sliding movement of the valve and therefore the relative proportions of hot and cold water, is located to one side *in a recess* out of the direct flow of fluid.
5. The hot and cold fluids passing out through the central valve opening pass directly into the body of the valve and out from the housing outlet.

These features listed above are the essential features which make a thermostatic valve operative for fire hose flow capacity, and these features are not shown in any one patent, and are not shown combined in any patent cited by the Patent Office.

Claim 12 is similar to Claim 11, except that an added feature is included, namely: that the ends of the valve are tapered. This tapering is for the purpose of minimizing resistance to movement of the valve as it is shifted in the very heavy flow of water.

III.

The Evidence Before the District Court.

The evidence submitted by the Appellants herein related to the nature of the invention, the time required for the invention, the difficulties encountered before successful results were obtained, and the construction and operation of the prior art patents which were cited against the subject matter of the two claims in issue.

The appellants' witness, Mr. Germain Ross, who is a foreman for the appellant Company, and who works on new developments (App. p. 23), has been in the employ of the appellant Company for about twenty-seven years (App. p. 23) and has helped the inventor, Mr. Leonard, in his development work (App. p. 23).

Mr. Ross described the operation of the particular valve for which the patent was applied for (App. pp. 23, 24), and stated that the capacity of the valve was three hundred gallons per minute (App. p. 24), which is a very large flow. He was asked about the specific features which made this valve operate for controlling the temperature of such large flows, and stated (App. p. 24, Q. 19), that the size and shape and position of the port openings affect the operation of the valve, and really mean the difference between success and failure. He stated that if the port openings were spaced farther apart, the valve would not function (App. pp. 23, 24) and would produce a surge which would allow water of different temperatures to come out of the outlet. The spacing of the ports, which are defined in the claims in issue as "closely adjacent the central partition" was considered by Mr. Ross to be *"very vital"*.

Further, Mr. Ross stated that the central opening in the valve tube itself must be as large as possible in order not to restrict the flow of the water (App. p. 25) and that this open character has a beneficial effect on the operation; that the valve would not work as well if it were not so open (App. p. 25).

Mr. Ross further stated, with reference to the setting of the thermostat to one side out of the path of direct flow of the fluid, that this has a direct influence on the operation of the valve, and that if the thermostat were not positioned in the side of the valve, it *would not function* as the valve in practice actually functions, the position of the thermostat thus being a very important feature in the operation of the valve (App. p. 26).

Thousands of these valves have been sold and are in operation the cost being a little better than One Hundred ($100.00) Dollars (App. p. 26).

Mr. Ross then explained what occurred during the development of this large sized valve here in issue. Mr. Leonard, who is an expert in the thermostatic valve line, started to try to develop a rotor type valve (App. p. 26), trying to get three hundred gallons a minute out of this type of valve. After working on it for six or eight months, he *could not make it operate* to control a large volume of water (App. p. 27). So then he went to the type of valve which is shown in Leonard Patent No. 2,110,884. He built that on a larger scale, but "*it would not work*" (App. p. 27). The actual model on the larger scale was shown to the Court.

Then Mr. Leonard changed the dimensions of the sleeve or valve tube (App. 28), and that did not solve the problem (App. p. 28); so then he asked Mr. Ross to make a new model with the outlet ports spaced close together. Such a model was built (App. p. 28), and "*it would not operate then*" (App. p. 29). However, the results were promising (App. p. 29), and then they moved the thermostat out of the path of the rushing water and then "the valve worked all right'' (App. p. 29). The total time for the development of this model which actually worked, was about three years (App. p. 29).

Mr. Ross then discussed Leonard Patent No. 2,175,203, explained how it operated, and explained that the capacity of this type of valve is ''about eight gallons per minute'' (App. p. 30). A valve of large size made exactly in correspondence with the construction of the small valve, to handle two hundred and fifty gallons per minute, *would not work* (App. p. 31).

Patent No. 2,122,600 was then considered. This is a thermostatic mixing valve manufactured by the Powers Regulator Company. The construction was explained (App. p. 31) and was disclosed as different from the valve here in issue (App. p. 31). This valve positions the thermostatic coil directly in the path of the flowing water (App. p. 32) and uses perforated discs to restrict the flow of water through the thermostat (App. p. 32). The capacity of this valve would be of from five to eight gallons, sufficient for a shower, and this type of construction could not be used for a large flow capacity valve, as ''*it would not be practicable*'' (App. p. 32).

Mr. Ross then considered Patent No. 1,127,627, a patent issued to Johnson, which uses a tapered disc to proportion the volumes of hot and cold water. Mr. Ross stated that this valve *would not operate at all* if there was any difference in pressure (App. p. 33), and that the water pressure in various cities does differ markedly between the hot and cold sides (App. p. 34), so that the pressure of the water would affect the thermostat, and therefore the operation of the valve (App. p. 35).

Patent No. 1,845,499 to Henneuse, was then considered, which patent was cited by the Patent Office as showing a tapering at the sides of the flow control valve. Mr. Ross showed ''that the ends of the valve instead of being tapered, are actually squared'' (App. p. 35). Mr. Ross further disclosed that the tapering of the Leonard valve here in issue is to ensure a smooth movement of the valve despite the high pressure and the large flow of water, this construction making it easier to cut through the water as it goes from side to side (App. pp. 35, 36).

IV.

The Decision of the District Court.

The District Court, after hearing arguments of counsel, and after considering the evidence and the prior art, rendered the opinion that "there is no invention in making a larger valve to accommodate a greater flow of water". From this decision the applicant and the assignee Company appeal.

V.

Argument.

Although the District Court held that there was no invention in making a valve larger in order to accommodate a larger flow of water therethrough, it is obvious that this is not the real issue before this Court. The evidence shows that Mr. Leonard did make larger models of his small valves and that they *did not work*. The evidence also shows that the other patents cited by the Patent Office were for small flows of water for shower baths, and would not work to control large flows of water if made larger.

The question before this Court is therefore not the simple question of whether Leonard merely made a larger valve, but instead resolves itself into the more specific question of whether the changes in valve construction made by Leonard in order to obtain an operative large valve amounted to invention, in view of the prior thermostat art.

It is therefore essential to a proper determination of the issue to examine the structure of the valve in issue, and to see wherein this structure differentiates from the prior art. Further, it then becomes necessary to examine these changes and see whether the changes are disclosed or suggested by the prior art. If the prior art does not disclose or suggest the specific changes which Leonard found necessary in order to make an operative large capacity valve, then it is clear that invention exists.

Since the structure of the invention in issue is defined in the claims before this Court, it is proper to particularly examine the claimed features.

The first claimed feature is that the entire body of the valve constitutes a mixing chamber and has spaced aligned hot and cold fluid inlets and a mixing fluid outlet. This construction is true of the earlier Leonard patents, and there is therefore no invention in this particular feature.

The next feature is the use of a tubular valve seat which is mounted on the valve body and which is provided with a central partition dividing the valve seat into two portions which respectively communicate at their ends with the fluid inlets, the portions having wall ports *closely adjacent the partition.* This construction is not found in any of the prior art patents, but is somewhat similar to the design shown in Leonard Patent No. 2,175,203, which the Patent Office has considered its base reference.

The same type of construction is also shown in Leonard Patent No. 2,110,884, also cited by the Patent Office. However, the exit ports for the outflowing hot and cold waters from the partition chambers are obviously *not* closely adjacent the partition, and there is not disclosure in either patent of any need for or any advantage obtained by any such re-positioning of the outlet ports. In fact, since both of the Leonard patents referred to are for small flows of water, it is actually preferable to space the valve ports apart, in order to create a fair amount of turbulence and thus obtain a better and more thorough mixing within the valve. But such spacing in the large valve, as testified to by Mr. Ross, would create a turbulence which would be highly undesirable, and would in fact render it inoperative.

It follows that the structural feature of placing the wall ports closely adjacent the partition is an essential feature for making the large valve work, this being verified by Mr. Ross's testimony, and that, there being no disclosure whatever in either prior Leonard Patent of any need or any function for positioning the wall ports closely adjacent the partition, this feature is not a feature either disclosed or suggested in the prior art.

The next feature specified in the claims is the provision of a tubular valve mounted on the valve seat and having a wall opening extending on both sides of the partition and over the wall ports when the valve is central, the opening permitting *direct* flow of fluid from the wall ports into the mixing chamber. Since the mixing chamber specified in the claim is defined as the entire body of the valve, it is proper to examine the two Leonard valves to see whether their valve openings permit direct flow of the hot and cold fluids into the body of the valve. Leonard Patent No. 2,175,203 obviously does not; the hot and cold fluids are led into an annular chamber which is designated 27 and is shown in Fig. 3 of the patent drawings, and the hot and cold fluids are thoroughly mixed in this annular chamber before the mixed fluid is passed into the body of the valve. In Leonard Patent No. 2,110,884, the hot and cold fluids emerge into a mixing well or chamber in which the valve is located, as is clearly shown in Fig. 3 of the drawings of this patent, and then the mixed fluid enters into the body of the valve, as is explained in lines 6 to 10 of Page 2 of the Specification. There is therefore no disclosure in either prior Leonard patents of the direct passage of the hot and cold fluids from the two sides of the partition into the valve body itself. However, other patents, particularly Johnson, do show such a flow of hot and cold water, but it is important to note that the prior Leonard patents cannot be changed to accomplish such a flow without completely reorganizing their constructions.

The next significant feature of the invention is that the valve body has a *recess* at one side of the mixing chamber out of the direct flow of fluid from the wall ports to the mixed fluid outlet, in which the thermostat is located. This construction is vital, as Mr. Ross has testified, to proper operation of the large valve, *in conjunction with the claimed positioning of the wall openings,* in order not to let the thermostat be impacted by the terrific stream of water passing through. The prior art does not disclose such an arrangement. The Young patent No. 2,122,600, protects its thermostat by means of perforated side shields; the Johnson patent No. 1,127,627, positions its thermostat above, but the thermostat is still impacted by the streams of mixed fluids, which are directed first downwardly by the central tapered valve 17 of Johnson and then are directed upwardly before they pass out of the outlet tube.

It is thus believed clear that the specific construction of the Leonard valve here in issue is not shown in any single prior art patent; that no prior art patent was designed for a large flow, and if made larger could not operate to control the larger flow; that the prior Leonard patents cannot be reorganized in view of the other cited patents without the application of invention; and that no prior art patent cited discloses or suggests the *combination* of the claimed valve parts with the specific positioning of the wall outlet ports closely adjacent the central partition and the mounting of the thermostat in a side recess out of the path of the rapidly rushing water.

The most practical and useful inventions are often accomplished by simple means. The question is not how simple these means may appear after the invention is made, but whether they have, by a new thought, a new conception of how a problem is to be practically accomplished, introduced a distinctive advantage in the art.

In *Consol. Valve Co.* v. *Crosby Valve Co.,* 113 U. S. 157, prior devices could have been converted into the device of the patent in suit by slightly changing the size of a strictured orifice in a valve, or by making that orifice adjustable, and it was contended that this involved no invention. The Supreme Court referred to the fact that some of the old devices had one feature and some another of the invention, but held that the invention consisted in securing certain advantages without sacrificing others; that

> "* * * this was a problem of the reconciliation of antagonisms which so often occurs in mechanics and without which practical results are not attained."

In *Topliff* v. *Topliff*, 145 U. S. 156, patents were sustained which were only distinguished from the prior art by slight differences in the advantages of the combination over prior combinations of elements under similar names, the court saying (p. 161):

> "It is not sufficient to constitute an anticipation that the device relied upon might, by modification, be made to accomplish the function performed by the patent in question, if it were not designed by its maker, nor adapted, nor actually used, for the performance of such functions."

In *Hobbs* v. *Beach*, 180 U. S. 383, prior devices corresponded very closely to that of the patent. The court, finding that the patented invention had proved substantially useful, held the patent valid. It said (p. 392):

> "While none of the elements of the Beach patent—taken separately or perhaps even in a somewhat similar combination—was new, their adaptation to this new use and the minor changes required for that purpose resulted in the establishment of practically a new industry, and was a decided step in advance of any that had theretofore been made."

Admittedly, the invention in issue is an improvement invention in an already crowded art. It does, however, constitute an advance in the art and the applicant is entitled to protection commensurate with the advance he actually made. The claims here in issue are limited claims, drawn to define the exact structural features found necessary by the Applicant for accomplishing his advantageous result.

It is submitted that Claims 11 and 12 define a valve construction which is not merely a prior art construction made larger, and instead represents a new combination and rearrangement of parts for obtaining a result not obtainable with the prior art constructions; that the claims are therefore not anticipated, and are allowable.

Respectfully submitted,

NATHANIEL FRUCHT,
Attorney for Appellants.

KARL FENNING,
Of Counsel.

APPENDIX

INDEX TO APPENDIX FOR APPELLANTS.

Page

I. Pleadings, Docket Entries and Other Papers Designated by Appellants 2
  Complaint 2
  Answer to the Complaint 6
  Opinion of Justice Bailey 8
  Request for Rehearing 8
  Memorandum Opinion Overruling Rehearing 11
  Findings of Fact 11
  Conclusions of Law 13
  Judgment 13
  Notice of Appeal 14
  Order as to Record 14
II. Testimony and Proceedings Designated by Appellants 15
  Opening Statement on Behalf of Plaintiffs.... 15
  Opening Statement on Behalf of Defendant... 22
  Testimony of Germain Ross 22
  Argument on Behalf of Plaintiffs 37
  Argument on Behalf of Defendant 45
  Further Argument on Behalf of Plaintiffs.... 47
III. Exhibits 50
  Plaintiffs' Exhibit No. 1 50
  Defendant's Exhibit No. 1 141

IN THE

United States Court of Appeals

DISTRICT OF COLUMBIA

No. 8851

LEONARD VALVE COMPANY AND FREDERICK C.
LEONARD, *Appellants,*

v.

CONWAY P. COE, COMMISSIONER OF PATENTS,
Appellee.

Appeal from the District Court of the United States for the District of Columbia.

APPENDIX TO BRIEF FOR APPELLANTS.

I.

PLEADINGS, DOCKET ENTRIES AND OTHER PAPERS DESIGNATED BY APPELLANTS.

1 In the United States District Court for the District of Columbia

Action under R. S. 4915 to Procure Patent

Civil Action File No. 18130

LEONARD VALVE COMPANY, 1360 Elmwood Avenue, Providence, Rhode Island, and FREDERICK C. LEONARD, 1360 Elmwood Avenue, Cranston, Rhode Island, *Plaintiffs,*

v.

CONWAY P. COE, Commissioner of Patents, *Defendant.*

Filed Dec 22 1942. Charles E. Stewart, Clerk.

Complaint.

1. Plaintiff Leonard Valve Company, a corporation organized and existing under the laws of the State of Rhode Island, and doing business at Providence, Rhode Island, and plaintiff Frederick C. Leonard, a citizen of the United States residing at Cranston, Rhode Island, bring this action against Defendant Conway P. Coe, United States Commissioner of Patents having an official residence in the District of Columbia, who is sued as United States Commissioner of Patents.

2. Jurisdiction is founded on Revised Statutes 4915.

3. In accordance with the laws of the United States and the Rules of the Patent Office Plaintiff Frederick C. Leonard filed an application for patent in the United States Patent Office entitled Thermostatic Mixing Valve on October 21, 1940, which was given Serial Number 362,045, and which was assigned to Plaintiff Leonard Valve Company, which assignment was duly recorded in the United

2 States Patent Office. The application has been passed upon by the Primary Examiner who twice rejected the claims. Thereafter applicant appealed from the decision of the Primary Examiner to the Board of Appeals which affirmed the rejection of the Primary Examiner in a decision dated June 23, 1942, rejecting the following claims:

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

12. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and

said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; the ends of said valve being tapered, said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

3 13. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; at least one end of said valve seat having a limit stop for said valve, said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

14. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening ex-

tending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fiuid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger, and said valve having a stem universally connected to said finger.

15. In a thermostatic valve, a body constituting a mixing
chamber and having spaced aligned hot and cold
4 fluid inlets and a mixed fluid outlet, a tubular valve
seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger having an enlarged tip, and said valve having a cylindrical stem provided with an elongated slot for said finger and housing the enlarged tip thereof.

All of which will appear more fully from a certified copy of the proceedings in the Patent Office to be produced in Court.

4. Plaintiffs aver that said invention is new and useful and was not known or used by others before Leonard's invention thereof and was not patented or described in any printed publication in this or any foreign country before his invention thereof or more than two years prior to said application for patent therefor and not in public use or on sale in this country for more than two years prior to said application and not patented in any foreign country by him or his legal representatives on an application filed more than twelve months prior to said application for United States patent and not abandoned.

5 5. No appeal has been taken from the decision of the Board of Appeals to the United States Court of Customs and Patent Appeals.

6. WHEREFORE plaintiffs demand adjudication that plaintiffs are entitled to a patent and directing the Commissioner of Patents to issue a patent to plaintiffs including said claims.

KARL FENNING,
Attorney for Plaintiffs,
Press Building,
Washington, D. C.

NATHANIEL FRUCHT,
Of Counsel,
Hospital Trust Building,
Providence, R. I.

* * * * * * * * * *

6 Filed Feb 1 1943

Answer to the Complaint.

1, 2. Defendant admits the allegations of paragraphs 1 and 2.

3. He admits the allegations of paragraph 3 but states that in line 21 of claim 11, as set out in this paragraph, the word *fluid* has been omitted after the word "mixed".

4. He admits that plaintiff, Frederick C. Leonard, filed in the Patent Office, on October 21, 1940, an application for patent, Serial No. 362,045, entitled THERMOSTATIC MIXING VALVE, and in said application made averments corresponding to the allegations of paragraph 4. He denies that such allegations are sufficient to justify the issuance of a patent containing any of claims 11 to 15, inclusive, of said application, as it is deemed that said claims are unpatentable in view of the following prior patents
7 and for the reasons given by the examiner in his statement on the appeal from his rejection of said claims and in the decision of the Board of Appeals, copies of which will be furnished at the trial:

Leonard	2,175,203	Oct. 10, 1939
Leonard	2,110,884	Mar. 15, 1938
Leonard	1,957,276	May 1, 1934
Johnson	1,127,627	Feb. 9, 1915
Young	2,122,600	July 5, 1938
Henneuse	1,845,499	Feb. 16, 1932
Kenney	1,980,624	Nov. 13, 1934

Profert of copies of the above-cited patents is hereby made.

5. He admits the allegations of paragraph 5.

W. W. COCHRAN,
Solicitor, United States Patent Office
Washington, D. C.
Attorney for Defendant

January 30, 1943

I hereby certify that a copy of this Answer to the Complaint was mailed today, January 30, 1943, to the attorney for plaintiffs, Karl Fenning, National Press Building, Washington, D. C.

W. W. COCHRAN,
Solicitor.

* * * * * * * * * *

62 Filed Jan 25 1944

Opinion of Justice Bailey

The plaintiff seeks to have the court authorize the defendant to issue a patent for a thermostatically controlled hot and cold water mixing valve. The general idea is old in the art. Plaintiff, however, claims that his contrivance is for the purpose of use where a strong stream of water flows throughout the valve (although this is not stated in the claims) and that for this reason the valve must be larger than the ordinary one. Also that the thermostat must be placed where it would not be affected by the strong current of water, and in addition a mixing chamber was needed.

The patent office held that the mixing chamber was disclosed in an earlier patent to the plaintiff; that the arrangement of the thermostat in a recess offset to one side of the chamber was old in a patent to Johnson.

It is obvious that there is no invention in making a larger valve to accommodate a greater flow of water.

I agree with the Board of Appeals of the Patent Office in finding no invention in plaintiff's claims, and the complaint should be dismissed with costs.

JENNINGS BAILEY,
Justice.

* * * * * * * * * *

63 Filed Jul 28 1944

Request for Rehearing.

Rehearing and reconsideration is respectfully requested of the decision of January 25, 1944.

As Mr. Whitehead pointed out in his letter to your Honor of January 13, the question here is "whether the finding (on the question of fact as to invention) that there was none is consistent with the evidence or what is the same thing is supported by the evidence." Minnesota Co. v. Coe, 73 App. D. C. 146. We think clearly the opinion is not supported by the evidence but is contrary thereto. The evidence (Record pages 18 to 23) shows that prior art valves made larger "would not work" (Q. 45) to carry a larger quantity of water. Applicant at first like the Patent Office, thought his problem was only to make a large valve. He made two larger valves like his prior patents, to which the court refers, and then perceived he must invent a new valve. After three years spent in designing, making and testing several different new valves, he succeeded in inventing the valve on which he now asks a patent (Q. 69).

64 In Min-A-Max Co. v. Sharoun Mfg. Co., 32 USPQ 499, the court sustained a patent for a Nozzle for Grease Gun said to be merely a high pressure device smaller than a prior device, saying:

> "Invention is not ordinarily involved in making some part of a device heavier or enlarging, lengthening, shortening or reducing some part to obtain the same result in the same way . . .
>
> Bowker reached a different and more desirable result in a different way. That he availed himself of a law of physics which is presumably known to at least some people but had never before been made use of in the same way, does not forbid invention. . . .
>
> That the change from old methods was simple when seen afterwards is not fatal. . . .
>
> Bowker shows inventive genius rather than mere mechanical skill."

There is invention in making such a larger valve as plaintiff has to accommodate a large flow.

Clearly, the evidence here shows it required invention for applicant who was highly skilled in the art to assemble for proper interaction the various new and old elements of the claims. Both the Patent Office and the court rely on prophecy of what could have been done without invention. "Prophecy however honest is generally a poor substitute for experience", as Justice Cardozo said in West Ohio Gas Co. v. Pacific Utilities Com., 294 U. S. 79, 82. The record here clearly shows that applicant's experience proved such prophecy incorrect. As Justice Holmes said in N.Y. Trust Co. v. Eisner, 256 U. S. 345, "Upon this point a page of history is worth a volume of logic."

The evidence here (Record pages 28 to 31) shows that the Johnson patent 1,127,627 does not have a pro-
65 tected thermostat in a recess out of the path of the
water flow. In applicant from 23 and 24 water goes uninterruptedly directly up through 54. In Johnson 1,127,627 the water from 4 makes nearly a 180° turn to get out 2. A fast flowing stream washes out the outer banks of all bends—so the fast flowing stream from 4 of Johnson (especially with 125 pounds pressure in 4 and 40 pounds in 3. Q 118) would pass through and press upon the thermostat 9 on the outer bank of the turn in the flow (Q 119, 120 R. p. 31). Thus the thermostat in Johnson is directly in the flow and not in a protected recess. Indeed, Johnson does not refer to a protected thermostat.

Neither applicant's prior patent nor Johnson suggests modifying the other and such a modification would not contain the elements of the claims underscored on page 44 of the record.

The claims should be allowed.

Respectfully,

KARL FENNING,
Attorney for Plaintiffs.

A copy of this paper is handed Mr. W. W. Cochran, Solicitor for the defendant, this 3rd day of February, 1944.

KARL FENNING.

* * * * * * * * * *

66 Filed Mar 1 1944

Memorandum Opinion Overruling Rehearing

I see no reason to change my opinion in this case.

The motion for a new trial or rehearing will be overruled.

JENNINGS BAILEY,
Justice.

Dated: March 1, 1944.

* * * * * * * * * *

67 Filed Mar 8 1944

Findings of Fact

1. This is an action brought under the provisions of Sec. 4915 R. S. (U. S. C., title 35, sec. 63) in which it was sought to have this Court adjudge that the plaintiff, Leonard Valve Co., is entitled to have issued to it, on the application of the assignor, Frederick C. Leonard, No. 362,045, filed October 21, 1940, a patent containing claims 11, 12, 13, 14, and 15.

2. At the trial all the claims, except 11 and 12, were withdrawn.

3. The Leonard application involved here discloses a thermostatic mixing valve having large flow capacity with a thermostatic member controlling the relative amount of hot and cold water passing through the valve, which is located in a laterally disposed recess out of the path of direct flow of the water passing through the valve.
68 A tubular member having opening therein closely adjacent a central separating partition is interposed between the hot and cold water inlets. Over this tubular member is placed a sleeve having central openings disposed over the closely adjacent tubular openings, the movements of this sleeve being controlled by the thermostatic member. The ends of this sleeve which are away from the hot and cold water inlets are tapered.

4. The patent to Leonard 2,175,203 discloses a thermostatic valve construction. This construction has a tubular member with openings therein disposed between the hot and cold water inlets with a sleeve constituting an annular mixing chamber, the sides of the mixing chamber cooperating with the tubular member openings and the annular mixing chamber having separate mixed water outflow openings, the movement of the sleeve being controlled by a thermostatic member located directly between the mixed water outflow openings in the tubular member and the outlet opening of the valve housing.

5. The patent to Johnson 1,127,627 discloses a device for automatically controlling the temperature of intermixed streams of hot and cold water having a thermostatically controlled valve pivotally mounted to swing between the two inlet passages, the outlet opening being to one side and the thermostat controlling the movement of the valve being located above the outlet opening and at one side of the mixing chamber.

6. The patent to Young 2,122,600 discloses a mixing valve for automatically controlling the temperature of
69 intermixed hot and cold fluids in which the thermostatically controlled element is located in the mixing chamber and is provided with shields having perforations therein to restrict the flow of water around the coil.

7. The patent to Leonard 1,957,776 discloses a thermostatically controlled mixing valve in which stop pins are provided to limit the movement of the mixing valve.

8. The patent to Leonard 2,110,884 discloses a thermostatically controlled mixing valve having a tubular valve member having tapered ends terminating respectively at the hot and cold water openings in the tube over which the valve moves.

9. It was not invention to make a mixing valve larger than oen previously used in order to accommodate a larger flow of water.

10. It was not invention, in view of the disclosure of the Johnson patent No. 1,127,627, to place the thermostat of

the Leonard patent No. 2,175,203 in a recess offset to one side of the valve chamber so that it will be out of the path of the direct flow of water through the valve.

11. The testimony discloses that a mixing valve having the construction of either patent 2,100,804 or patent 2,175,203 when made merely larger to provide for carrying a strong stream of water did not produce satisfactory thermostatic regulation of the outflowing water.

12. Neither claim 11 nor claim 12, of the Leonard application, involved in the proceeding, defines an invention over the patents cited in defendant's answer.

70 *Conclusions of Law.*

1. The plaintiffs are not entitled to a patent containing claims 11, 12, 13, 14, and 5 of the aforesaid Leonard application, or any one of them.

2. The complaint should be dismissed with costs against the plaintiffs.

JENNINGS BAILEY,
Justice.

March 8, 1944.

* * * * * * * * * *

71 Filed Mar 8 1944

Judgment

This action came on to be heard at this term and thereupon, upon consideration thereof, it is, this 8th day of March, 1944,

Adjudged that the complaint in this case be, and the same hereby is dismissed with costs against the plaintiffs.

JENNINGS BAILEY
Justice.

Approved as to Form:
KARL FENNING
Attorney for Plaintiffs.

* * * * * * * * * *

72 Filed Jun 7 1944

Notice of Appeal

Notice is hereby given that Leonard Valve Company and Frederick C. Leonard, Plaintiffs, above-named, appeal to the United States Court of Appeals for the District of Columbia from the final judgment entered in this action on March 8, 1944.

KARL FENNING
Attorney for Appellants
National Press Building
Washington, D. C.

* * * * * * * * * *

73 Filed Jun 15 1944

Order as to Record

Upon consent of parties hereto, through their respective counsel, it is this 15th day of June ordered that the original transcript of proceedings at the trial and the original exhibits as designated by counsel be transmitted to the United States Court of Appeals of the District of Columbia in lieu of copies.

(s) JENNINGS BAILEY
Justice

Consented to:

(s) KARL FENNING
Counsel for Plaintiffs

(s) W. W. COCHRAN
Counsel for Defendant

* * * * * * * * * *

II.

TESTIMONY AND PROCEEDINGS DESIGNATED BY APPELLANTS.

10 Filed Jun 22 1944

Washington, D. C.
Thursday, January 13, 1944

* * * * * * * * * *

Opening Statement on Behalf of Plaintiffs

Mr. Fenning: May it please the Court, this is a suit under section 4915, to authorize the Commissioner of Patents to grant a patent to Frederick C. Leonard for a
11 valve for the control of a mixture of hot and cold fluids.

I have here a specimen of the valve. I will not hand it to you yet—if I may. Maybe you will not want to look at it at all.

May I hand up these two copies of drawings of the application for patent?

Now, preliminarily, let me read, if I may, the opening paragraphs of the specification:

> ''My present invention relates to thermostatic mixing valves, and has particular reference to mixing valves having large flow capacity.
>
> ''It is the principal object of my invention to provide a novel mixing valve construction which accurately controls the temperature of a large volume of mixed fluid.
>
> ''Another object of my invention is to provide a simple and efficient control mechanism for a large size reciprocating valve.''

The ordinary mixing valve is of this size (exhibiting a valve), the pipes being one inch, more or less, as a maximum; and that size is the equivalent of the faucet in the ordinary house or the ordinary lawn hose. The valve in which we are interested here, as you can see, has about a

2½ or 3 inch inlet and the outlet is somewhat larger; and that is approximately the size of the hose which is used to put out fires.

I call attention to that because, as your Honor well knows,
you or I can handle or control the hose which is used
12 to sprinkle the lawn. But when fire hose is used,
with the large flow and high pressure, it is another proposition. Such hose might knock over the firemen, so they go out in groups to hold it. So that the problem of dealing with a large flow, under high pressure, is different from the problem of dealing with a small flow. This valve is not for fire use; and I merely used that as an illustration.

The purpose of this valve is primarily to take care of laundries. In recent years they have demanded a controlled flow of large quantities of water; and they asked Mr. Leonard, who has been in the valve business for many years, to produce such a valve; and he has produced this.

Now, the drawings you have before you show the particular structure. If you will look at Fig. 1, you will see that it is a face view of this particular valve. Fig. 2 is an internal section. Fig. 3 is an internal section in another direction. Figs. 4, 5, and 6 are details of that construction.

We are not concerned with the handle; but I will call attention to that handle control, which is marked 51 on the drawings, Fig. 1 and Fig. 2. It goes through the face plate and controls the setting of the thermostat.

The thermostat is the coil marked 39 in Fig. 2 and shown also in Fig. 3. When the coil is heated, the end of it moves in one direction and when it is cooled it moves in the other
direction, so that it shifts that tubular valve.

13 We now get to the essence of our invention here.
You will notice that Fig. 2 shows an arm 34, which goes over to a tube 32 which is attached to the valve. The valve itself is shown in Figs. 3, 4, and 5. There is an inner valve, a valve seat, so-called, a tube like the specimen that I have in my hand, which is in the inside of the device, and is marked 21, 22, and 23; and 24 indicates the holes in that.

In Fig. 2 that is held stationary. It has at its center a thin partition; and immediately touching that partition are oblong holes.

In Fig. 3 the water comes in from the left, for instance, through the opening 14, goes through the tube and can not pass the partition, and goes out through the oblong holes 23. Those are shown below in Fig. 4, where you will see the tube with the oblong holes. The central partition is shown at 22; and the cold water comes in from one side to the partition and the hot water comes in from the other side.

In order to regulate the proportion of hot and cold water, there is provided a sliding valve, which is shown in Fig. 5. This valve is a cylinder, as you will see, and at its center are rectangular holes, which are placed one on each side, so that a single hole will overlie both hot and cold water outlets from the tube itself. The movement of that sliding valve is controlled by the tubular stem 30, which, as you will observe, is controlled by the thermostat itself.

14 The flow of water, then, is in through the two sides, into this central hole; and then the quantity of water which comes out is varied by the lateral position of the valve, shown in Fig. 5, so that if it is pushed one way more hot water will come out into the mixing chamber and if it is pushed the other way more cold water will come out.

Turning to Fig. 2, that is a view in cross section; and the member marked 22 is the central dividing partition; but the water comes up to that partition from both sides; and then it exits on the two sides of the central tube, mixes, and passes directly up through the mixed fluid outlet 54 at the top.

The thermostat itself is not in the path of the moving water. It is in one side of the casing; and that is important for two reasons: first, with the high rate of flow and the heavy pressure which is used with this large valve, the thermostat, if it were placed in the path of the moving water, would be wrecked very shortly; and, second, because of the high flow, a thermostat, or any other projection in there, would interfere with the outflow of the water and tend to break the pressure and clog the valve. That is a distinction over what would be used in the smaller device, with the smaller flow of water going through it.

You have, I think, understood the mechanism as I went ahead—have you not? Have you any questions to ask?

The Court: That operates through a series of cog
15 wheels shown in Fig. 2?

Mr. Fenning: That is not a series of cog wheels; that is a thermostatic coil.

The Court: It is shown in this drawing, Fig. 2, as a series of cog wheels.

Mr. Fenning: I beg your Honor's pardon. There are cog wheels in there—one marked 44.

The Court: Yes.

Mr. Fenning: That handle operates the cog wheels, so as to turn the shaft marked 36, to which the inner end of the thermostat is fastened. If that is moved to the left, it will place the base of the thermostat in one position; and if it is moved to the right it will place it in another position. Consequently, if you set it for 300 degrees, for instance, the thermostat will move the valve or keep it in a certain position; and if you set it at 350 degrees, the base will be shifted to another position——

The Court: The thermostat, then, after you once set it, controls the movement of the valve?

Mr. Fenning: Yes. You will note in Fig. 2 that the upper end of the handle of the thermostat carries a screw 57. Now, that is not shown in contact with one of those holes; but it is shown on this particular valve; and what is done is this: That is not like the ordinary thermostatic valve which we use for a shower bath and which we may change from time to time. We set this where we want it and
16 let it stay in place. That handle, by the way, is not involved in this suit.

The Court: Yes; I understand.

Mr. Fenning: Now may I read you a claim? You have before you, I believe, the bill, which contains copies of the claims.

We are confining ourselves here to claims 11 and 12 only, the first two claims.

Mr. Whitehead: You are withdrawing the others?

Mr. Fenning: We are withdrawing the others.

The Court: Then you are withdrawing 13 and 14?

Mr. Fenning: Yes, your Honor, and 15.

Now, I may say that in the bill a word was omitted from claim 11, as was pointed out in the answer of the Patent Office; and I have taken the liberty to insert the word, "fluid", in lead pencil, in the original copy.

Claim 11 reads:

"In a thermostatic valve, a body constituting a mixing chamber——"

Now, that body is the main structure shown in Fig. 2, marked 11, I believe, on the drawing. The mixing chamber, then, is the whole area of the valve itself.

"and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet,——"

Those spaced fluid inlets are shown in Fig. 3 as 14 and 15; and the mixed fluid outlet is shown as 54. The water
17 comes in from the right and the left.

"a tubular valve seat mounted in said body——"

That is the device shown in Fig. 4 and shown in position in Fig. 3; that is mounted in the body.

"and provided with a central partition——"

That is marked 22 in Figs. 2 and 3; and that, of course, is a solid partition. I have the valve here before me, in the large size; and that has a hole in it, which is used for construction purposes only. It is filled in with a plug and is closed in actual use.

"dividing the valve seat into two portions having their ends respectively communicating with the inlet,——"

That is, with the hot and cold water inlets.

"said portions having wall ports closely adjacent the partition,——"

You will remember those. If you will look at Fig. 3 you will see that the openings 23 and 24 are practically touching the partition.

"a tubular valve mounted on said seat——"

That is shown in Fig. 5.

"and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central,——"

That means that the normal position of this valve lets both hot and cold water in.

"said opening permitting direct flow of fluid from
18 said wall ports into the mixing chamber,——"

There is nothing between those ports and the mixing chamber itself, which is the main body of the valve casing.

"and said valve being movable to increase flow of liquid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion;——"

That, of course, means, as I have suggested, that a movement to the right will cover, we will say, some of the hot water valve ports partially and at the same time will further open or uncover some of the cold water ports.

"said body having a recess at one side of the mixing chamber——"

You will note in Fig. 2 the part 11 to which the cover or handle fits has a recess on the side of that.

"out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid."

I think your Honor sees what we are driving at there.

The Court: Yes.

Mr. Fenning: Now, claim 12 is exactly the same, with the exception of the four or five lines from the end, after defining the valve itself——

"the ends of said valve being tapered——"

That is the last word in the seventh line from the bottom there.

The Court: Yes.

19 Mr. Fenning: Now, you will notice, in Fig. 5, at 28, the ends of the valve are tapered; and they are tapered to assure ease of movement of the valve. Inside of the casing is water at high pressure and moving at high speed all the time; and it is necessary, in order to get ready adjustment at all times, that the ends of this valve be tapered.

There is one thing I want to emphasize as much as I can: the fact that we are dealing here with a large valve; and you will find in the specification, in the parts I have mentioned, and on page 3:

"It has been found desirable to provide an accurate and efficient thermostatic mixing valve construction for large flow capacities, such as for example 10,000 gallons per hour. Such valves require maximum port openings,"

and so forth.

I have a copy of the file wrapper here, which I will introduce in evidence.

(Certified copy of file wrapper and contents in application of Frederick C. Leonard, Serial No. 362,045, was received in evidence and marked as Plaintiffs' Exhibit 1.)

Mr. Whitehead: If your Honor please, we have here the same old question of whether it is invention to make certain changes.

If you will look at the folder which I have handed
20 up to you, you will notice a patent to Leonard, Item
G, number 2,175,203.

The question comes down to whether there is invention in changing the position of the thermostat in that valve from being directly in the path of flow of the water to a position over on one side.

There are other references which show that valves of this kind were made and were sold and placed; and we have the question of whether there is invention in this change; and the Court of Appeals of the District of Columbia has affirmed decisions on the same grounds.

Also, I will call your Honor's attention to the fact that there is nothing in this claim per se indicating in any way that this structure is designed for use under heavy pressures rather than under the ordinary water pressure in the house. There is not a thing in any way to say that that is the purpose of it.

Mr. Fenning: May I say just one word?

I did not appreciate that the merits of the invention would be gone into in the opening. But a mere change in the position of the thermostat in that prior Leonard valve will not respond to these claims.

Mr. Ross, will you take the stand?

Mr. Frucht will examine him.

Thereupon—

21 **Germain Ross,**

called as a witness for plaintiffs, was first duly sworn and was then examined and testified as follows:

Direct Examination

By Mr. Frucht:

Q. 1. Will you please state your full name? A. Germain Ross.

Q. 2. What is your age? A. Fifty-one.

Q. 3. And what is your present occupation? A. I am a machinist with the Leonard Valve Company.

Q. 4. How long have you worked for the Leonard Valve Company? A. About twenty-seven years.

Q. 5. Do you mind stating, in detail, what is the work that you do for the Leonard Valve Company? A. Well, I am foreman and I also do development work.

Q. 6. This development work that you have just mentioned: what kind of development work is that? A. On thermostatic mixing valves.

Q. 7. Has that been your own work or that of anyone else in the company? A. What do you mean?

Q. 8. Has that been your own development work or the development work of others? A. Of Mr. Frederick C. Leonard.

22 Q. 9. That is, you have actually helped Mr. Leonard in his development work? A. That is right. I have machined the parts and have assembled the valves.

Mr. Frucht: The particular valve that we are discussing here now, your Honor, is this large sized valve (exhibiting a valve).

Q. 10. Do you recognize what this particular valve is, Mr. Ross? A. Yes. That is what we call our Type T valve. That is a T-300.

Q. 11. Will you describe how that valve operates—from the actual model?

(The witness demonstrated with a valve while he testified.)

A. Yes. The cold water comes in on the right side and the hot water on the left side, passing through this tube out of the ports.

Q. 12. Will you show it to the Court? A. Out through here, going directly; and the cold water coming out there and the hot water coming out there are so close together that the hot and cold water are mixed and go through the outlet.

These ports are regulated through the thermostat. This wall port, here, is enlarged, in this receiving member, and the thermostat is here; and when the water in here gets too
hot it closes the hot water ports and opens the cold
23 water ports; and when it gets too cold it closes the
cold water ports and opens the hot.

Q. 13. Is this a transverse movement of the valve that you have just demonstrated? A. Yes.

Q. 14. That is from side to side? A. Yes; that is from side to side; yes.

Q. 15. What is the capacity of that valve you have? A. Three hundred gallons per minute.

Q. 16. Is the Leonard Valve Company making any larger sizes according to that design? A. No, sir.

Q. 17. Does the Leonard Valve Company make any sizes larger than that valve? A. No, sir.

Q. 18. Do they intend to make any larger sizes? Have they planned any? A. They have had calls for them; but they have not planned them as yet.

Q. 19. Will you please examine that model and the openings through which the hot and cold water come—the valve openings and the port openings? Do the size and shape and position of those port openings have any effect on the operation of the valve? A. They certainly do.

Q. 20. What effect do the size and shape and posi-
24 tion of the port openings have on the operation of
the valve? A. Well, those things really mean the difference between success and failure.

Q. 21. That is, if the port openings were spaced farther apart, would that valve function as well? A. No; it would not. Spacing farther apart would cause a surging and would allow of water of different temperatures coming out of the outlet.

Q. 22. Do you, then, consider that the spacing of those ports so as to be as close as possible to each other is vital to the operation? A. Very vital.

Q. 23. Would you kindly look at the valve tube itself, which goes over the ports? That has a central opening which extends over the port areas of both the hot and the cold sides. What effect has the size and the position of that valve opening on the operation of the valve? A. Well, that opening must be as large as possible, in order not to restrict the flow of the water.

Q. 23. If there were a complete absence of any intermediate partition, would that have any effect on the operation of the valve—that is, as to whether the valve opening was absolutely open and of large size, or not? A. Yes; it would have. If it were not absolutely open, that would create a back pressure against that moving element.

Q. 24. You mean that the fact that the valve opening is of the open character shown has a beneficial effect on the operation? A. That is true.

Q. 25. Would it work as well if it were not so open? A. No, sir; it would not.

Q. 26. Now please look at the valve again. The thermostat itself is set at one side, out of the path of direct flow of the fluid? A. That is right.

Q. 27. Has that recessing, or setting to one side, of the thermostat, so that it may not be in the path of direct flow of the fluid, any effect on the operation of the valve? A. Yes, sir; it has.

Q. 28. What is the effect? A. If it were in the path of the rushing water, the valve would not operate as well.

Q. 29. Do you know why or can you tell us why? A. The force of the water would tend to move these parts and would throw this moving element, aside on what we call the valve seats, and would cause that to move over to one side and change the temperature of the outgoing water.

Q. 30. Then, if the thermostat were not positioned in the side of the valve, would it function as the model itself does actually function? A. No, sir; it would not.

26 Q. 31. You would, then, consider the positioning of the thermostat as an important feature in the operation of the valve? A. Very important.

Q. 32. How does the valve actually work in operation? A. That valve works very well and it holds the temperatures at the predetermined setting.

Q. 33. Have many of those valves been sold? A. Oh, yes; thousands.

Q. 34. Have you any information as to what the price of the valve is? A. No; I don't know exactly. My job is to make a batch of them. I imagine it is a little better than $100.

Q. 35. You stated that you helped Mr. Leonard in his development work? A. Yes.

Q. 36. Do you know what started Mr. Leonard developing this large size valve? A. Yes. Customers demanded a large flow valve.

Q. 37. That is, there was an actual demand in the trade for this type and capacity. A. Yes. We received a letter from—I will say not a customer but a prospective customer, asking if we could manufacture a valve of this capacity.

Q. 38. What did Mr. Leonard do then? A. He immediately started experimenting.

27 Q. 39. Were you familiar with his experiments? A. Yes, sir.

Q. 40. Would you mind stating what he did in his experimental work? A. Well, he started to try to develop a rotor type valve—trying to get 300 gallons a minute out of a rotor type valve.

Mr. Frucht: For your Honor's information, I wish to explain what is meant by a rotor type valve.

The Witness: That is one of the exhibits in the book.

Mr. Fenning: It is patent number 1,957,276, to Leonard, Item D of the Patent Office exhibit.

Mr. Frucht: This type that is now brought before your Honor is a reciprocating type valve, in which the valve slides from one side to the other. The rotor type is where the valve turns; and that is what the witness had reference to in his statement.

By Mr. Frucht:

Q. 41. You stated that Mr. Leonard had started his experimental work with the rotor type valve? A. That is right. And after working on it for—I don't know—six or eight months, we found that we could not make it operate to control a large volume. So then he had the idea of going to the Type T valve.

Q. 42. What type? A. T.

Q. 43. What kind of valve is that? A. That is one
28 we were making at the time—a small size valve.

Q. 44. Is that the type shown in patent number 2,110,884, to Mr. Leonard? A. That is the one.

Q. 45. And what did he do then? A. Well, we tried to build that on a larger scale; but it would not work. That is the one that——

Q. 46. I show you this model and ask you; is that the larger scale valve? A. It is.

Q. 47. That Mr. Leonard built? A. Yes, sir. You will notice that the parts are approximately the same as the smaller one, only of a larger size.

Mr. Frucht: Does your Honor wish to have these models put in as exhibits?

The Court: If the drawings are here, I have an idea of what they are.

Q. 48. What did you do then? A. We worked on this type for about four months. We could not get it to operate properly.

Q. 49. Is the large size model that you were just examining the same as the smaller size model I now show you? A. Yes, sir; it is the same.

Mr. Frucht: For your Honor's information, the small
model of this type is a commercial model, actually
29 manufactured and sold in large quantities by the
Leonard Valve Company; and the essential features
of it are a reciprocating spindle valve in the center, which
moves back and forth.

By Mr. Fenning:

Q. 50. Does that correspond with this patent that you have just looked at? A. No, not that.

(Mr. Frucht demonstrated the model valves to the Court.)

By Mr. Frucht:

Q. 51. You stated that this large size model, which was very similar to the construction shown in patent number 2,110,884, did not work? A. No, sir; it did not.

Q. 52. What did Mr. Leonard do then? A. Well, he thought that, on account of the high pressure of the water, that it was hitting the sides of the thimble as the water rushed out, and that was one reason it did not work. So he then asked me to make a sleeve much thinner than this.

Q. 53. What do you mean by "sleeve", Mr. Ross? A. This moving part on the top, that goes over this part, here (indicating).

Q. 54. You mean the part shown in Fig. 6 of Leonard patent 2,110,884? A. Yes, sir, number 33.

30 Q. 55. Number 33? A. Yes, 33, on Fig. 6.

Q. 56. Did it work any better? A. No, sir; it did not.

Q. 57. What did Mr. Leonard do then? A. Well, he said it was probably because those holes were spaced too far apart and it did not get the proper mixture. So then he asked me to make one with the holes spaced close together.

Q. 58. And the holes are in the tube or in the valve structure? A. In the tube.

Q. 59. And did you make such a model? A. Yes, sir; we did.

Q. 60. Is this (producing a valve) the model? A. Well, this is the case, but not the interior parts.

Q. 61. What happened then? A. It would not operate then.

The Court: I did not understand what you said?

The Witness: It did not operate. Let's see. Now, wait a minute. Oh, yes. The other one, here (indicating).

Well, then, when we brought those holes closer together, it looked very promising. Of course, when we made this valve, we took the thermostat out of the path of the rushing water—which we had in this one. You can see—we
31 have a recess, here, for the thermostat. And then we did that before we brought the holes closer together.

By Mr. Frucht:

Q. 62. And did it work then? A. But when we did bring the holes closer together, then the valve worked all right.

Q. 63. Is that (exhibiting a valve) the model which Mr. Leonard worked out and for which you made the parts? A. This is the one; that is right.

Q. 64. I notice some openings you were just touching at the top of the valve. What are those for? A. Those are openings we used to put thermometers through on each side, to show how the water was acting on different parts of the valve.

Q. 65. That is in an experimental model? A. Yes, sir; that is in an experimental model.

Q. 66. And did you from that develop the actual valve which is the large size valve here in court, under discussion? A. Yes, sir; we did.

Q. 67. About how long would you say it took Mr. Leonard to develop the large size valve from the latest type valve? A. Just this one, here (indicating)?

Q. 68. From the latest type. A. I should say about a year.

Q. 69. About how long did he work on all of his
32 experiments for the large valve? A. For this large type I would say about three years.

Q. 70. I show you patent number 2,175,203. Do you know what it is? A. Yes, sir; that is a Leonard water mixing device.

Q. 71. Is this model I now show you anything like that patent? A. Identically.

Q. 72. Do you mind explaining the operation of the valve and showing how the water flows through it and what the parts are—both from the patent and from the model? A. (demonstrating) The same thing here. The cold water comes in on the right side and the hot water comes in on the left side; and they go through that small tube, which has holes, and they are mixed in the thimble that it set over those holes, which, in turn, has holes which let the mixed water out into the body of the valve, hitting the thermostat.

Q. 73. Where does the fluid mix in this type of valve shown in patent 2,175,203? A. Inside the small thimble, marked number 27, I believe. I think that is 27.

Q. 74. Is there any mixing in the body of the valve? A. The water is mixed when it comes into the body of the valve.

Q. 75. In that place where it mixes, which is in this small
space, how many port openings are there for letting
33 the mixed water out? A. There are three.

Q. 76. Are they of large size? A. I beg your pardon?

Q. 77. Are they of large size? A. A quarter inch, I believe.

Q. 78. And that takes care of the entire flow of hot and cold water? A. Yes.

Q. 79. What is the capacity of that valve? A. About eight gallons per minute.

Q. 80. Where is the thermostat positioned? A. Practically over the thimble and sleeve.

Q. 81. Does that mean that it is within the path of flow to the outlet or outside the path of flow? A. Directly in that path of flow.

Q. 82. Mr. Ross, could you make a valve of large capacity, of large size, for example of the size of the large valve under discussion here, 250 gallons per minute, with this type of construction? A. No, sir; we could not.

Q. 83. I show you patent number 2,122,600. (That is in the Patent Office folder.) Will you please tell me if you
know what that is? A. Yes, sir; that is a thermostatic
34 mixing valve, manufactured by The Powers Regulator Company.

Q. 84. What is the name of the inventor? A. H. J. Young.

Q. 85. Have you seen that type of valve? A. Yes, sir.

Q. 86. Can you tell me how it operates—from the drawings and from your own knowledge? A. Yes, sir. Cold water comes into one side, and goes through the poppet valve, which splits the water, half flowing through the bottom and the other half through the top. Both hot and cold water come through different ports; but the action is the same on each. Then they mix in the body and go through the bottom to the opening and out through the outlet; and in going through the port previously mentioned the water passes through the coil.

Q. 87. What coil are you referring to? A. The thermostatic coil.

Q. 88. What kind of valve is that for controlling the inflow of hot and cold water? A. What kind of valve?

Q. 89. Yes. What kind of valve? A. It is a poppet type.

The Court: What kind?

The Witness: Poppet.

By Mr. Frucht:

Q. 90. Is that different from the valve shown in
35 the Leonard large capacity valve? A. Yes; it is.

Q. 91. I will ask you to look at page 2 of the specification of the patent and read lines 38 to 41.

Mr. Whitehead: Which column?

Q. 91. (continued) In the first column. A. Line 35:

"I provide shield plates 49 on both sides of the coil, closing the open ends thereof and include one or more perforations 50, in the discs 49, as may be necessary to restrict the flow of water round the coil and thus retard the response of the thermostat to changes in temperature."

Q. 92. What does that description mean to you? A. Well, it means that the water is going through the coil and actuating the coil.

Q. 93. You mean that the flowing water actually flows through the thermostat? A. Yes, sir.

Q. 94. And what is the purpose of those discs with the holes in them that you have just referred to? A. He says that is to retard the movement of the thermostat.

Q. 95. You mean the flow of water through the thermostat would be too large unless the flow was retarded
36 and the effect would be that it would not operate
properly? A. Yes, sir. If that were not so, he would not have put those shields on the sides of the coil.

Q. 96. Now will you please look on page 1, second column, and read lines 45 to 48?

A. (reading) "In operation it will be seen that on rotating the handle and stem the valve 45 is moved away from its seat permitting the passage of the requisite volume of cold water to a shower or other point of use."

Q. 97. What would that disclose to you as to the capacity of the valve. A. Why, it would be five to eight gallons, sufficient for a shower.

Q. 98. And is that the size, from your own knowledge, of this construction which is on the market? A. It is.

Q. 99. Could you make a large capacity valve, say of 250 or 300 gallons per minute, by just making that particular construction much larger? Could you make such a valve operative? A. Well, I don't know. It would make an enormously large valve, in the first place.

Q. 100. Would it be practicable? A. Not to my way of thinking, no.

Q. 101. Would there be any interference with the flow of water through the valve, if it were made of such a
37 large size? A. Yes. All those parts would be directly in the path of flow of the water, which would restrict the flow. You see, all that apparatus is hinged right there near the ports; and if the rush of a large flow of water were to hit that, it would probably move it up and down and the temperature of the outlet water could not be regulated.

Q. 102. I show you patent number 1,127,627 (which is also in the book the Court has). The name of the inventor is Johnson. Have you ever seen a construction like that, Mr. Ross? A. No, sir.

Q. 103. Has an attempt been made by you or anyone else in the Leonard Valve Company to manufacture constructions like that? A. Yes; we have tried to. We have one model, with a disc, not a tapered disc but a straight disc, between two pipes, going like that.

Q. 104. Will that valve operate for all kinds of flows of water? A. No, sir; it will not operate if there is a difference of pressure between the hot and the cold water.

Q. 105. What happens if there is a difference in pressure? A. If you should have 70 pounds on the cold and 40 on the hot it would move that element over and disturb your regulation.

Q. 106. Does that ever happen in practice? A. Yes, sir.

38 Q. 107. Take a city like Providence. What is the city water pressure in Providence? A. Seventy pounds per square inch.

Q. 108. And in an ordinary installation what would the pressure of the hot water be? A. It would all depend on what heating system you have there. On a very small flow valve the pressures are about equal. But on a large capacity valve, they have to have a different sort of heating unit to heat a large quantity of water; and some times the pressures vary from 70 pounds on up.

Q. 109. What would be the water pressure in a city like Worcester? A. I was there at Worcester for a week, at Holy Cross College; and we had 125 pounds at the fifth floor. Providence has 75 pounds, but East Providence has 125 pounds.

Q. 110. So that the water pressures in different cities vary quite a good deal? A. That is right.

Q. 111. And the water pressure would have a very great effect on the operation of a valve of this type? A. If there were a difference of pressure between the hot and cold water, yes.

Q. 112. How does the water flow through the Johnson valve? A. That water comes in from each side and hits that tapered piece there, some going down through the bottom and some up through the top.

39 Q. 113. Is the main flow up or down? A. Down, I would say.

Q. 114. Would you read from the patent? Will you read from page 1, lines 42 to 50? A. 42 to 50?

Q. 115. Lines 42 to 50, first column.

A. (reading) "The bottom of the valve is preferably cup-shaped to receive the drain cock 6 so that sediment may be removed. Vegetable and mineral fibers and other impurities that enter through the inlets, instead of lodging between the valve and its seats and thus interfering with the movements of the valve, will fall into the cup 11."

Q. 116. What does that tell you about the flow of water in the valve? Does that tell you where it is? A. The water goes down or the sediment goes down, it possibly goes down, into the cup.

Q. 117. So that the water goes down and then up and out at the side? A. Around through this outlet on the side.

Mr. Whitehead: 2?

Mr. Fenning: 2 is the numeral on that.

The Witness: Of the tube.

By Mr. Frucht:

Q. 118. If you had a flow through the Johnson valve of water of very high pressure, that is, from 75 to 125
40 pounds, as in Providence or Worcester, and of quite large volume, say of 250 gallons per minute, would that flow impinge on the thermostat? A. I do not think it would on this tpye of thermostat.

Q. 119. Would the water hit the thermostat on its way going out? A. It would.

Q. 120. So that the thermostat would actually be affected by the movement of the water? A. That is true.

Q. 121. I show you patent number 1,845,499, the patent to Henneuse, which is in the Patent Office exhibit the Court has. The Patent Office mentioned that this patent shows a tapering at the sides of the flow control valve. What is the number of that valve? A. It is 17.

The Court: Where do you find that? I find everything around here but 17.

(Mr. Fenning indicated to the Court on the patent drawing.)

Mr. Whitehead: At the bottom of Fig. 2.

The Court: I thank you.

By Mr. Frucht:

Q. 122. Are the sides of that valve 17 shown tapered? A. No. The end is squared. That looks like a reinforcing rib there on the side that is tapered.

Q. 123. In connection with the matter of tapering, will you please look at the large size model of the Leonard
41 valve before this Court? Are the sides of the valve tapered? A. The ends are.

Q. 124. The ends are? A. The ends of the valve are tapered.

Q. 125. What is the purpose of that tapering? A. That is just to assure a smooth movement of this valve.

Q. 126: It is because of the high pressure and the large flow? A. Yes, sir.

The Court: That is the one that is referred to in claim 12?

Mr. Frucht: Yes, your honor. It calls for the sides of the valve being tapered.

The Witness: Yes. In other words, that is to make it easier to cut through the water as it goes from side to side.

By Mr. Frucht:

Q. 127. So that it is of some help in the actual movement of the valve by the thermostat? A. Yes, sir; it is.

Mr. Frucht: Your witness.

Mr. Whitehead: I have no cross examination.

(The witness retired from the stand.)

The Court: Is that all?

Mr. Fleming: We close our case, your Honor.

42 Mr. Whitehead: I offer in evidence, as Defendant's Exhibit 1, this folder, comprising copies of:

A Johnson patent 1,127,627
B Henneuse patent 1,845,499
C Kenney patent 1,980,624
D Leonard patent 1,957,276
E Leonard patent 2,110,884
F Young patent 2,122,600
G Leonard patent 2,175,203
H Print of drawings
I Examiner's statement
J Decision of the Board of Appeals
K Decision of the Board of Appeals on request for reconsideration.

(The document so produced and identified was received in evidence and marked as Defendant's Exhibit 1.)

Mr. Fenning: May it please the Court, I have prepared no brief; and I do not know what your desires are with respect to that.

The Court: Well, either oral argument or a brief. Or, if you will, let me have a transcript of your opening statement.

Mr. Fenning: Thank you, sir.

The Court: Which would you prefer? Just to furnish the transcript?

Mr. Fenning: I think it would be entirely sufficient.
43 I do not believe that we have any cases to cite here,
because your Honor is familiar with the patent law and knows the problems.

The Court: Do not assume that.

Mr. Fenning: I will say this: You certainly are familiar with the phases of the patent law on which we rely here.

The Court: Then you rely on the Examiner's statement and the decision of the Board of Appeals?

Mr. Whitehead: Yes, your Honor.

Argument on Behalf of Plaintiffs

Mr. Fenning: We have here an invention which, as you have learned, is the result of a good deal of difficult work by an expert in the art. Mr. Leonard has been making valves for many years. He has a large plant and his purpose is to sell a valve and to make a valve which he can sell. He was approached to devise and manufacture for sale a large valve. He then assumed, as the Patent Office has assumed, that, if you have a small valve and want to make a large valve, you merely enlarge what you have. He found that it was impossible to do that. After considerable thought and work, he got, by a flash of genius, the result which we have presented to your Honor today.

Now, that result is a valve which is a very material improvement. It answers a want and it is the only thing, apparently, which does answer that want. It is not anticipated
by any of the references.
44 Your Honor well understands, of course, that it is
common in the patent law to say that all elements of an invention are old. The combination does not cover any of these elements but covers the assemblage or combination of those elements, and their interaction and the result of the interaction.

We may readily admit here that each individual structure we employ might have been old in the art. Each of those structures is not shown in the art here cited. Certainly there is nothing in the prior art which shows an assembly in one structure of all these elements; and there is nothing in the prior art which shows an assemblage of any structure which will work for our particular purpose.

If I may revert for a moment to some of these prior patents. The basic patent on which reliance is had by the Patent Office is the Leonard patent 2,175,203. Mr. Leonard, of course, being the inventor of that patent, was entirely familiar with what it covers. He did not employ the structure of that patent.

Now, there are several things in that patent which do not respond to the claims we have before us now. You will remember that the claims call for "wall ports closely adjacent the partition" in the main valve tube. To be sure, the ports, which are marked 24 in this Leonard patent, are spaced somewhat away from the partition—not very far away, somewhat away from the partition. They are opened, not by an open valve, but they are opened into a mixing chamber—a closed mixing chamber it is called. You will note, at the bottom of Fig. 3, that the wall of the mixing chamber 27 is closed. You will note on Fig. 4 that the walls of that are provided with three openings, marked 28. Now, that means that in the position shown in Fig. 4 merely a portion of the water which goes out of the upper hole 24 in the inner valve has a free outlet; and that is not really a free outlet, because the holes 28 are shown smaller than the hole 24. The other opening, at the bottom of the valve, does not have a free opening at all. There the water merely hits against the side wall of the valve and goes, as the arrows show, to the right and left, so that the mixing takes place in that tube. With small pressure, that is possible. But you can realize that if the stream which goes through a fire hose were squirted through these holes, it would do one of several things: it would probably break any reasonable structure that could be put in there—by the high pressure. Again, the large flow produced by the high pressure would cause the valve to stand still, so that no thermostat would be sufficient to move it back and forth. The thing would clog and would not work.

Mr. Leonard knew that much and he did not even try to use this structure for his large valve, because he knew it would not work.

You will remember that the thermostat in this device is
directly between the inlet and the outlet, so that when
46 there is a flow of water there it impinges on the thermostat—the high pressure water just can not go by
the thermostat. It will interfere with the thermal operation and with the mechanical operation of the thermostat. Those two phases are brought out in the claims.

Now, the Patent Office says that this Leonard patent 2,175,203 anticipates. But, they say, even if it does not anticipate, you can go somewhere else and get some things that will make a change. They refer to Mr. Leonard's patent 2,110,884, which was a patent allowed by your Honor some years ago.

The Court: Yes. I remember that my son told me the reason I allowed it was that I had been scalded once in a shower bath.

Mr. Fenning: I am sorry that you were scalded; but we will accept the benefit.

It is a practical device, which has gone into use. That has two features which are relied on by the Patent Office. It shows holes in the inner tube and it shows a spool on the outside; but the spool does not have an opening which covers the inner holes. It merely runs between the inner holes. It has tapered ends; but that would not work with high pressure, for two reasons. The first is that the high pressure would be so great that there would be substantially no mixing; the water would come out of one hole
47 and rise and go out of the other hole; hot and cold

would rise separately. Again, the pressure on the sides of that spool would be so great that the thermostat would not move it. That is particularly true with pressures of 75 to 125 pounds. In other words, the pressure is on the outer ends of the movable valve, whereas the applicant has the pressure, not on the ends of the valve at all, but through the holes in the middle of the valve.

Again, in this particular patent the mixed water goes directly through the thermostat. In Fig. 2 it goes in through the tube marked 28; and it goes directly to the right, through the thermostat; and then out through the passage 51; and then up through the outlet pipe 4. Again, that does not anticipate the particular structure we have.

Leonard patent 1,957,276 I will not discuss, because that was cited merely to show stops on the movement of the valve; and the claims on that we have withdrawn.

In passing, I may say also that that stop was one of the main reasons for citing the Henneuse patent 1,845,499. The Henneuse patent was cited, however, also for showing the tapered valve.

If your Honor will look at the Henneuse patent, you will find that the edges of the valve, marked 17 on Fig. 2, and shown without similar reference numerals on Fig. 1,—the right and left edges of that valve are perfectly straight and
the water impinges on them. They are straight; and,
48 set in a little way from the edges, there are two re-
inforcing ribs. The only tapering at all is a little tapering on the tip, not of the valve but of the reinforcing ribs themselves. So that I think that patent is of little consequence.

The Kenney patent 1,980,624 is of substantially no interest here. It is cited merely to show a ball and socket joint, as shown in Fig. 6, between the thermostat and the rod 16; and that is not of interest to us here.

We come then to the Young patent 2,122,600; and, if your Honor is able, by following it very carefully, to determine the passage of the water shown in that patent, you are able to do more than I can do.

As nearly as I can figure, there is some sort of a large mechanical structure here; the outline as shown is circular. You will find in Fig. 1 the word "cold" at the right. There is an opening 11, which meets the "cold" pipe. From that is a channel which runs in, which is under 33. 33 apparently is some sort of valve, which is shown on Fig. 4 with a ball top, so that the water goes through there and over to the right, to the valve 27; and the valve 27 is not shown in Fig. 1, but it apparently is about under the portion marked 28.

Now, remember, the water has come in and gone through here, and over, and divided into the top and lower parts of this poppet valve; and then we will assume it has gone out of the poppet valve.

In the meantime, the hot water has come in from
49 the left side, through the pipe marked 12; and then
a similar ball valve, shown merely by a hexagon—no reference numeral. From that it goes through some kind of a complicated passage to the ball valve near the reference numeral 4 in Fig. 1; and it there woes out both top and bottom.

The apparatus between the valves is shown in Fig. 3, so that there is a large mechanical obstruction inside the valve. Apparently the water, having come out of the poppet valves, hot on one side and cold on the other side, must run around that interposed mechanical piece until it gets to the center of the entire circle shown in Fig. 1. In its passage, it passes the termostat shown at 36 in Fig. 1. It then drops down through the central opening 44 and comes out a passageway to the exit 13 at the top of the circle. In its passage through, that water obviously does not have a free passage. That can be seen very clearly.

Real pressure would probably wreck that particular structure, no matter how strongly and sturdily it was made. The water passes through the thermostat.

The patentee is afraid to leave his thermostat in the path of flow of the water, exposed to the flow of the water, and

he provides shield plates on both sides of his coil. If you will look at Fig. 1 and Fig. 2, you will see that there are shield plates 49 put at each side of the thermostat. They would keep the water from passing through the thermostat,
but he provides small holes 50, one of which is shown
50 in Fig. 2 and there is another shown at the more or
less opposite side of Fig. 2. Those little holes are put in the plates which impede the passage of the water through the thermostat. The water hits the baffle plate; it hits the hole; and some of it goes around. There is no free passage there. It could not be used for a high pressure device.

Our claims call for free passage; and the Patent Office relies on that Young patent for a thermostat set in a recess. As a matter of fact, the entire casing is a mixing chamber and the thermostat certainly is not in any recess.

The other patent on which the Patent Office relies to show a recess is the Johnson patent number 1,127,627. As Mr. Ross explained, this patent is probably inefficient for almost anything. It certainly is inefficient for high pressure.

You will note that there is a valve 17, which, as the specification says, will go against the seat 19 to close that pipe or against the seat 20 to close that pipe, as controlled by the thermostat. If we assume that that valve is in position, receiving the pressure of the water as it comes in, there may be equal pressure on both sides and be a more or less effective control by the thermostat. But if the device were put into operation with 40 pounds pressure on one side and 125 pounds pressure on the other side, it would merely shove the valve closed on one side; and, no matter how hard the thermostat worked, it would not be able to control the
valve. You will remember that that structure which
51 encases the thermostat is larger than the pipe 3,
which is shown of relatively small size, and the large casing around it is about three times as large, so that the water coming up to that valve under high pressure will

dash down and be washed around in that lower chamber and some of it will go up; and then, as it rises, it will tend to travel straight up and turn to the outlet pipe shown at the right side.

Now, with small pressure, because of the opening of the outlet hole, and the suction coming through, the water will probably be carried out that way; but under high pressure, inevitably, a considerable portion of that water will hit the thermostat and the pressure on the thermostat will be deleterious to it.

Johnson does not say that his thermostat is in a recess or out of the path of flow of the water; and we must remember that the purpose of the patent system is not to afford an opportunity for the use of imagination but to give a teaching. Johnson shows no anticipation. If Johnson's thermostat is in a recess, he has not said so and he has not shown any purpose for that recess.

I have demonstrated fairly well that the elements which are important in our case are not present in this prior art.

Now, Mr. Whitehead suggests (and, as far as I can see, it is the only suggestion that he has made which is of any importance) that our claims do not themselves claim a valve for high pressure. That is true, but every
52 claim must be read in view of the specification.

The Court: Hasn't the Supreme Court held that it must be in your claim?

Mr. Fenning: I am coming to that in just a moment.

The Supreme Court has held that a claim identically reading on a prior art device is not patentable, although something in the specification might help it. Here, however, our claims are not readable on anything in the prior art. Time and again a device which is used for one purpose is held patentable, although it has previously been used for another purpose. You will remember the old case where a pug mill for mixing clay was made with blades on the edges of the rolls to work the clay.

Now, that identical structure, that is, a roll with the blades on the edge of it, was used in a planing mill, for planing wood. The Supreme Court said that, although the words of the claim read on the pug mill, it was used for another purpose; and the claim was sustained.

Mr. Whitehead: It was in a non-analogous art.

Mr. Fenning: It was in a non-analogous art.

We have here not only a specification which says that; but we have in our claims specific things which are not found in the prior art.

May I read this claim 11 again? Remember, it is a combination claim and all of the elements cooperate in a certain, specific way:

53 "In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition,——

That is new.

"a tubular valve mounted on said seat and having a wall opening extending on both sides——"

That is new.

"of the partition and over said wall ports when the valve is central, said opening permitting direct flow of the fluid from said wall ports into the mixing chamber,——"

That is new.

"and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.''

The thermostat in the recess is new.

54 Now, when those things are combined in our way and produce our result, we think we are entitled to a patent.

Claim 12, as I have indicated, requires that the ends of the valve be tapered. The Patent Office relies on the prior Leonard patent 2,110,884 as a reference against that. There is a valve there which has tapered ends; but you will note that the incoming water impinges on those tapered ends; and the purpose there seems to have been to get a beveled tapered surface, so that mixture would take place immediately from those tapered ends. The oncoming pressure is put on those tapered ends. Our tapered ends, however, are not at the outlet opening, which is the inner rectangular opening, but they are at the far end, and their purpose is to ease the movement of that valve, which I think is a new and meritorious purpose.

I thank you.

Argument on Behalf of Defendant

Mr. Whitehead: If your Honor please, it is true that sometimes it has been held, in many cases, that you can make an invention by bringing together a number of things which are, each in itself, old. But it does not follow, as has been argued more than once in cases that I have had the last year, that the other way around it is true also, that is, that if you do have such a combination of old elements, it necessarily follows that invention has been made. I know
of no decision that has held that. After all, what we
55 get in all these cases is the question of the teaching
of the art.

But it has been stressed by Mr. Fenning today that no one patent in the art cited by the Patent Office responds in detail to either of these claims.

As I read the case of Cuno Engineering Co. v. Automatic Devices Corporation, decided in November or December, 1941, the Supreme Court in so many words said that of itself did not mean patentability. As I have sometimes expressed it, novelty and utility and all together do not spell patentability. You have got to have invention.

The question here is not of these petty details, not that the art suggested the exact thing that Mr. Leonard put into his new valve—but did it suggest a valve of that type, so that when you put in the valve with tapered edges, you were doing just what the art already suggested as to that particular thing. Any human being would know that a heavy flow of water would flow more smoothly over a tapered tube than over a tube with plain ends.

Certainly it has been shown here that a thermostat may be set to one side, not exactly as in the device Mr. Leonard made before; but that in a device of this kind you can set a thermostat out of the direct path of flow.

Now, when he determined to make a valve to operate where the water was flowing in large quantities and under high pressure, almost necessarily it would follow that a little valve would not do the work. So we have the
56 question whether it was invention to make that
larger valve to do the desired work, by making certain changes in the design of the small valve.

The Examiner thought that was not invention and the Board of Appeals agreed with him.

In that respect, I will call your Honor's attention (if you have not seen the decision) to the recent decision of the Court of Appeals of the District of Columbia in Magnaflux v. Coe. In that case, which I tried in both courts, Judge Egderton says that each of the elements was old and then draws the conclusion that there was no invention in bringing those together.

I had argued (and I still believe I was right) that the prior art taught what he did.

And then, in the next paragraph of his decision, Justice Edgerton makes this statement, that the administrative action is entitled to a presumption of correctness. He calls attention to the fact that for years and years we have always said that a patent was presumptively valid, because it has passed through the scrutiny of the experts of the Patent Office. And then he says that when the experts have decided that there is no invention, then their judgment at that time is entitled to the same presumption of validity as a the times when they thought that invention had been made. In other words, you could not divide the actions of the Patent Office into two classes, in one of which it was always presumptively right in granting a patent, and in another class no presumption follows that the action
57 of the Examiner in refusing a patent was right. That, he says, is not true. And he says (that decision was in one of these 4915 suits) that, in order to grant a patent, you must find that that presumption is overcome before you have any basis for rendering a decision that a patent should be granted.

I have not gone into details. The Examiner and the Board of Appeals have both done that. The Examiner has pointed out wherein these changes are such that a man skilled in the art would make such changes without invention.

Further Argument in Behalf of Plaintiffs

Mr. Fenning: May it please the Court, I have no fault to find with the Magnaflux decision. We feel that here we have overcome the presumption that the Patent Office was right.

The Court: As I understand, it is not a question, as it is in the ordinary civil action, of the burden of proof. In other words, as the Court of Appeals, I think, has said, you are in the position of plaintiffs seeking to set aside a judgment.

Mr. Fenning: That, apparently, is what it is.

Now, when we come to that conclusion, we must remember that there is another thing, which is the equity of the inventor. From—I almost said time immemorial—at least as long as I have been practicing law and before that the
courts, in considering the granting of patents, have
58 said that the benefit of doubt is given the inventor,
for this reason——

The Court: Right there. That might be true in the Patent Office, but is is true in the Courts? You are seeking to overcome that.

Mr. Fenning: The Court of Appeals of the District of Columbia and the Court of Customs and Patent Appeals have both enunciated that idea.

The Court: I know they have enunciated it. But have they applied it?

Mr. Fenning: They have applied it in many cases.

You will appreciate that it is very difficult for one reading a decision to know all that has passed in the mind of the tribunal; but there are cases where the Court has definitely said "We are in doubt and we will give the benefit of the doubt to the inventor."

The Court: Are those 4915 cases or cases where the Court of Customs and Patent Appeals passed on an appeal from the Patent Office?

Mr. Fenning: In both kinds of cases.

May I explain the underlying theory of that. When a patent has been granted, its terms are fixed. The Court looks at it and says "Now, it is necessary for us to determine finally whether it is an invention or not; and in doing that we necessarily must decide finally." But in 4915 cases the Court says "I do not wish to reach the conclusion that
there is nothing patentable here, because, if I refuse
59 to grant the patent, then there is no opportunity for
the applicant ever to procure anything, no matter
what the situation is, no matter how much proof he can bring, no matter how strongly he can reinforce his claim to validity."

Here we have done those two things, which satisfy my mind, and I hope they satisfy your mind, to overcome the burden on us.

The decision of the Board of Appeals, as you will see from the file wrapper, was handed down, not after oral argument, but merely on the consideration of a written brief; and I think your Honor will take judicial notice of the fact that frequently in reading a paper a different aspect is given to the case from what is presented when there is an opportunity for oral argument and for the tribunal to make inquiries.

Again, we have here the testimony of the man versed in the art, who has done the actual work. He knows what the prior art is; he has seen the prior art. This inventor was asked to produce such a valve; and it took him three years to produce it. Now, if, as Mr. Whitehead says, anybody would know how to do it, it would not take that man, in his effort to produce the thing, three years to achieve a commercial result. He would not waste his time and energy in that way.

Now, when we come to invention, the question always is an indefinite question. Nobody has ever set down any definite criteria for it. I understand an effort is now
60 being made to draw a bill and to get it through Congress,
which will do that—which would be a great relief to you, I presume.

The Court: It would be a great relief to me.

Mr. Fenning: It would be a great relief to all of us.

We have had a group of patents brought in here as showing the teaching of this application. The chief reliance is on Mr. Leonard's own patents. If Leonard had taught the art in those patents, certainly he would know that, and he would use it. The teaching was not there. And, if the teaching were not there, then it requires invention to produce this device.

As the Supreme Court said in an early case, a patent should be granted to anyone who gives information which could not be procured from somebody else without invention. That is the case here, because Mr. Leonard says "Here is the way to produce this valve."

Mr. Whitehead: The Court of Appeals, in one of its recent decisions, noted very carefully that other courts, including the Court of Customs and Patent Appeals, had proceeded to waive all doubts in favor of the applicant; but they did not apply that doctrine. I think I can get one of the very recent decisions which makes that distinction.

Mr. Fenning: That is not true here.

Mr. Whitehead: I am trying to correct that one statement. I think I can find that case for you. I think there is a very recent decision that shows that.

61 Mr. Fenning: I assume that your Honor does not want briefs.

The Court: That is right.

(Thereupon the instant hearing was concluded and the Court took this case under advisement.)

* * * * * * * * * *

III.

EXHIBITS.

Plaintiffs' Exhibit No. 1.

80 Mail Division Oct 21 1940 U. S. Patent Office

U. S. Patent Office Paper No. October 29 1940
Division 30

Oct 21 40 73570 HCheck 30.00

Petition

To the Commissioner of Patents:

Your Petitioner, Frederick C. Leonard, a citizen of the United States, residing at Cranston in the County of Providence and State of Rhode Island and whose post-office address is 1360 Elmwood Avenue, Providence, R. I. prays that Letters Patent may be granted to him for the improvements in Thermostatic Mixing Valve set forth in the annexed Specification.

And he hereby appoints Nathaniel Frucht, Hospital-Trust Building, Providence, Rhode Island, Register No. 12211, his Attorney with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign his name to the drawings, to receive the Letters Patent, and to transact all business in the United States Patent Office connected therewith.

Signed at Providence, in the County of Providence and State of Rhode Island this 18 day of September 1940.

FREDERICK C. LEONARD

Specification

To All Whom it May Concern:

Be It Known, That Frederick C. Leonard a citizen of the United States residing at Cranston in the County of Providence, and State of Rhode Island has invented certain new and useful improvements in Thermostatic Mixing Valve of which the following is a specification:

81 My present invention relates to thermostatic mixing valves, and has particular reference to mixing valves having large flow capacity.

It is the principal object of my invention to provide a novel mixing valve construction which accurately controls the temperature of a large volume of mixed fluid.

Another object of my invention is to provide a simple and effective control mechanism for a large size reciprocating valve.

A further object is to provide a novel tubular valve construction for a thermostatic mixing valve.

Still another object of my invention is to provide a novel and effective mounting for a tubular valve seat.

With the above and other objects and advantageous features in view, my invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto.

Referring to the drawings:

Fig. 1 is a plan view of the novel mixing valve;

Fig. 2 is a vertical sectional view on the line 2-2 of Fig. 1, parts being broken away;

82 Fig. 3 is a section on the line 3-3 of Fig. 2;

Fig. 4 is a perspective view of the novel valve seat;

Fig. 5 is a perspective view of the novel valve; and

Fig. 6 is a section on the line 6-6 of Fig. 3.

It has been found desirable to provide an accurate and efficient thermostatic mixing valve construction for large flow capacities, such as for example 10,000 gallons per hour. Such valves require maximum port openings, minimum interference with free fluid flow, and elimination of internal disturbances such as surging. I have therefore devised a valve construction for large capacity flows, which has a small number of parts, which is readily manufactured and assembled, and which is quick to respond to variations in temperature of the mixed fluid.

A preferred constructional embodiment of the novel mixing valve is illustrated in the drawings, the valve being designated 10, and comprising a base 11, see Fig. 2, and a removable cover plate 12, secured to the base in any suitable manner, as by means of bolts 13. The base 11 has a hot fluid inlet 14, see Fig. 3, and a cold fluid inlet 15, both inlets being threaded to receive fluid inflow conduits or pipe connections, one inlet having an inwardly extending
83 boss 16 having a recessed face 17, and the other inlet
having a transverse ring 18 internally threaded to receive a correspondingly threaded adjustment bushing 19 which also has a recessed face 20, whereby a tubular valve seat 21 may have one end mounted in the recessed face 17 and the other end locked in the recessed face 20 of the threaded bushing 18.

The valve seat 21 has a central partition 22 and a plurality of hot fluid outflow ports 23 and cold fluid outflow ports

24 disposed on opposite sides of the partition, the ports being preferably of oval shape. A limit stop 25 is threaded or otherwise mounted in the valve seat, as shown in Fig. 4.

A tubular valve 26, see Fig. 5, is provided, having two central flow openings 27 of sufficient width to normally permit flow of both hot and cold fluid, the ends 28 being chamfered or bevelled, it having been found that such ends eliminate surging. A transverse extension 29 supports a tubular stem 30 which has a longitudinal slot 31 therein for receiving a ball end 32 of an operating lever 33, having a reduced intermediate portion 34, the engagement of the ball end and the tubular stem constituting a universal connection.

The lever 33, see Fig. 2, is attached to an extension plate 35 which is preferably integral with a hub 36 rotatably mounted on a second 37 which in turn is
84 mounted on a fixed shaft 38 threaded into the face
plate 12, a thermostatic coil 39 having its inner end 40 keyed to the hub 36 and having its outer end 41 secured to an arm 42 which is preferably integral with the hub 37, the hub 37 having a gear 43 keyed thereto. A smaller gear 44 is keyed to the reduced inner end of a control shaft 45, mounted in the face plate, and meshes with the gear 43; a control handle 46, see Fig. 1, is selectively keyed to the outer end of the shaft 45, which end extends forwardly of the face plate, by means of an end lock nut 47, packing bushings 48 and 49 being provided for the forward end of the shaft 45, the latter being threaded to a forwardly extending annular boss 50 of the face plate. The handle 46 has the usual graspable end 51, and a pointer 52 which cooperates with a dial 53 to indicate the temperature of the mixed fluid flowing through the mixed fluid outlet 54, and has longitudinal grooves which are selectively engaged by keys 55 on the control shaft 45, a spring 56 being provided to yieldingly press the control handle outwardly. The pointer end has a threaded lock screw 57 which is selectively engageable with suitable spaced openings 58 in

the dial 53 to releasably retain the handle at any selected setting.

The novel valve, see Fig. 2, has its operating mechanism located at the cover end, the body providing an unusually free flow for the hot and the cold fluids from the inlets to the outlet; the central partition is preferably made as thin as possible, in order to bring the outflowing streams of hot and cold fluid in close adjacency.

85 It is thus evident that a very simple and effective valve mechanism has been devised which is quickly responsive to changes in mixed fluid temperature and which can take care of very large fluid flows, there being no internal disturbances or surging. The preferred material is brass to resist corrosion.

Although a specific constructional embodiment of the invention has been described and illustrated, it is obvious that changes in the size of the parts, their material, and their relative proportions, may be made to suit the requirements for different liquid flows and flow controls without departing from the spirit and the scope of the invention as defined in the appended claims.

86 I claim:

1. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and movable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, and thermostatic means in said body for moving said valve in response to change in temperature of the mixed fluid.

2. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat hav-

ing a flow opening communicating with said wall ports and slidable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, and thermostatic means in said body for sliding said valve in response to change in temperature of the mixed fluid.

87 3. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and movable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, and thermostatic means in said body for moving said valve in response to change in temperature of the mixed fluid, said thermostatic means having a universal connection with said tubular valve.

4. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and slidable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, and thermostatic means in said body for sliding said valve in response to change in temperature of the mixed fluid, said thermostatic means having a universal connection with said tubular valve.

88 5. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and movable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow

opening, thermostatic means in said body for moving said valve in response to change in temperature of the mixed fluid, said thermostatic means having a universal connection with said tubular valve, a manually movable handle for initially setting said thermostatic means, and mechanism connecting said handle to said thermostatic means comprising reduction gearing.

6. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and slidable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, thermostatic means in said body for sliding said valve in response to change in temperature of the mixed fluid, said thermostatic means having a universal connection with said tubular valve, a mannually movable handle for initially setting said thermostatic means, and mechanism connecting said handle to said thermostatic means comprising reduction gearing.

89 7. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat communicating with said inlets and having a separating partition and wall ports for the hot and cold fluids, a tubular valve seated on said seat having an outflow opening and movable to selectively increase flow of one fluid and decrease flow of the other fluid through said opening, said tubular valve ends being reduced in thickness, and thermostatic means in said body for mixing said valve in response to change in temperature of the mixed fluid.

8. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat communicating with said inlets and having a separating partition and wall ports for the hot and cold fluids,

a tubular valve seated on said seat having an outflow opening and slidable on said valve seat to selectively increase flow of one fluid and decrease flow of the other fluid through said opening, said tubular valve ends being reduced in thickness, and thermostatic means in said body for sliding said valve in response to change in temperature of the mixed fluid.

90 9. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its ends communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and movable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, thermostatic means in said body for moving said valve in response to change in temperature of the mixed fluid, said valve and valve seat being positioned in free open communication with said mixed fluid outlet to provide an unrestricted flow channel, and said thermostatic means being positioned laterally of said flow channel.

10. In a thermostatic valve, a body having spaced hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat having its end communicating with said inlets and a separating partition, and having spaced wall ports for the hot and cold fluids, a tubular valve seated on said seat having a flow opening communicating with said wall ports and slidable to selectively increase flow of one fluid and decrease flow of the other fluid through said flow opening, thermostatic means in said body for sliding said valve in response to change in temperature of the mixed fluid, said valve and valve seat being positioned in free open communication with said mixed fluid outlet to provide an unrestricted flow channel, and said thermostatic means being positioned laterally of said flow channel.

91 In Testimony Whereof I affix my signature

FREDERICK C. LEONARD

Oath

State of Rhode Island, County of Providence, ss:

Frederick C. Leonard the above-named petitioner, being duly sworn, deposes and says that he is a citizen of the United States and a resident of Cranston, Rhode Island that he verily believes himself to be the original, first, and sole inventor of the improvements in thermostatic mixing valve described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States, on an application filed by him or his legal representatives or assigns more than twelve months prior to this application; and that no application for patent on said improvement has been filed by him or his representatives or assigns in any country foreign to the United States.

FREDERICK C. LEONARD

Sworn to and subscribed before me this 18th day of September, 1940

MAX SCHWARTZ
Notary Public

362045 59

Print of drawing as originally filed

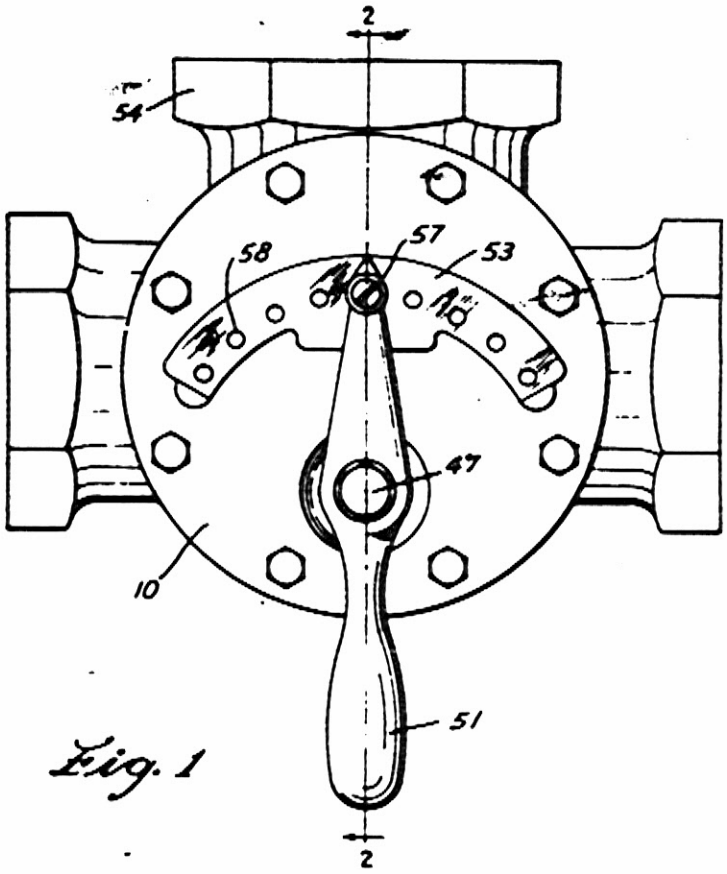

Fig. 1

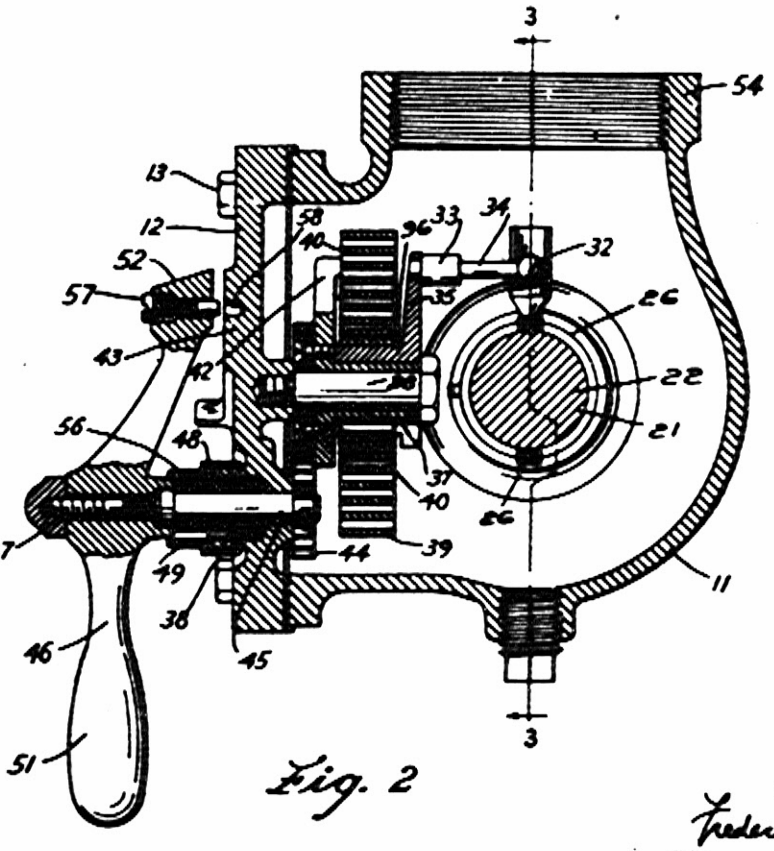

Fig. 2

INVENTOR
Frederick C. Leonard
BY
Nathaniel Frucht
ATTORNEY

362045

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Print of drawing as originally filed

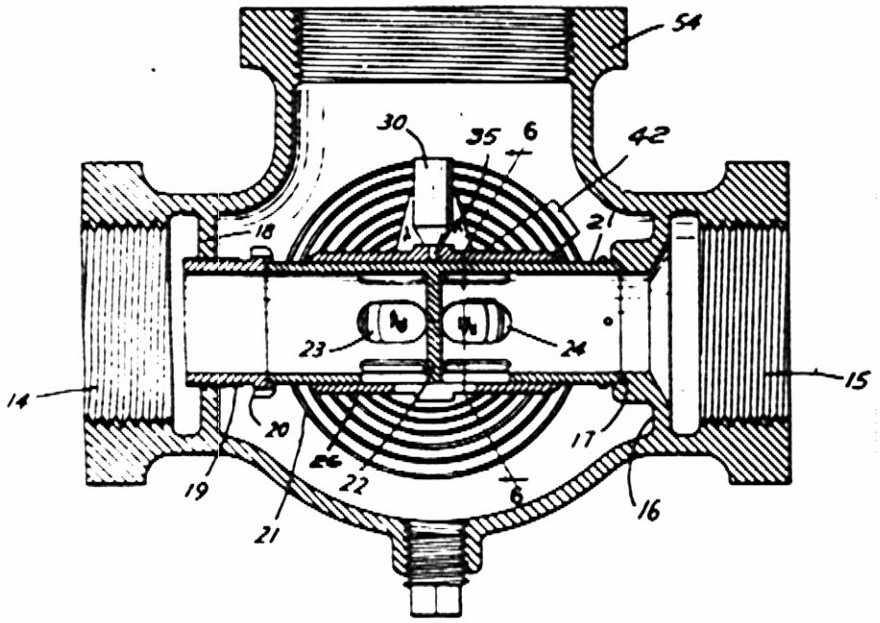
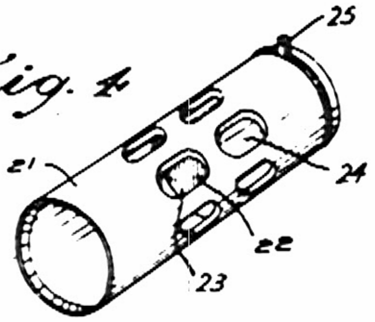


Fig. 3

Fig. 4



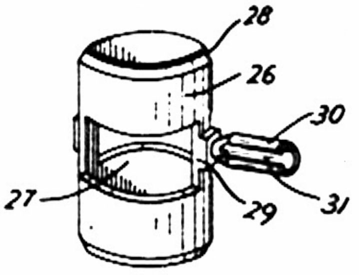


Fig. 5

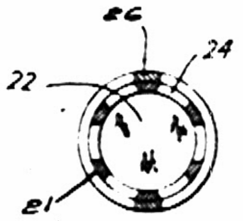


Fig. 6

INVENTOR
Frederick C. Leonard
BY
Nathaniel Frucht
ATTORNEY

362045 14

94 Div. 30 Room 4078 ADS:RN Paper No. 3

Department of Commerce
United States Patent Office
Washington

Applicant: Frederick C. Leonard
Ser. No. 362,045
Filed Oct. 21, 1940
For Thermostatic Mixing Valve

Mailed Jan 15 1941

Nathaniel Frucht
Hospital Trust Bldg
Providence, R. I.

This application has been examined.
References made of record:

Johnson	1,127,627	Feb. 9, 1915	236-12
Lemery	1,658,726	Feb. 7, 1928	"
Murdoch	1,724,504	Aug. 13, 1929	"
Henneuse	1,845,499	Feb. 16, 1932	"
Kenney	1,980,624	Nov. 13, 1934	236-12 ux
Young	2,122,600	July 5, 1938	236-12
Leonard (1)	2,110,884	Mar. 15, 1938	"
" (2)	2,175,203	Oct. 10, 1939	"

The oath is informal since it is not in accordance with Rule 46. See Sec. 4886 R. S. The statutory period for publication, public use etc., is now one year. A new oath is required. Such oath must be properly identified as by the Serial number and filing date of this application.

The Draftsman objects to the drawing which is admitted for examination only, because the shading is poor in parts. This may be corrected at applicant's expense, but need not be done until and unless patentable subject matter is found in the case.

Claims 1, 2, 3, 4, 7 and 8 are rejected as being substantially met by Leonard (2) upon which the claims are clearly readable. The ends of valve 26 in Leonard (2) are reduced in thickness as compared with the center at flanges 32. Furthermore, reducing the thickness at the edges of a sliding valve is a trivial and obvious expedient shown to be old by each of Henneuse, and Figs. 4 and 6 of Leonard (1).

Claims 5 and 6 are rejected as lacking invention
95 over Leonard (2) especially in view of Lemery and
Murdock. There would be no invention in adjusting
the Leonard (2) thermostat by means of reduction gearing
in the manner amply suggested by each of Lemery and
Murdoch.

Claims 9 and 10 are rejected as lacking invention over Leonard (2) especially in view of any one or all of Johnson, Kenney, Fig. 6 and Young which show that it is old to position the thermostat of a mixing valve laterally of the flow channel. Furthermore, it is obvious that the outlet conduit of Leonard (2) may be connected in place of the pipe plug shown at the extreme right in Fig. 4.

The claims are further rejected as being unduly multiplied. Each of claims 2, 4, 6, 7 and 10 differ from the claim preceding it merely by reciting that the valve is "slidable" whereas, the preceding claim recites the valve as "movable". Such distinction is obviously trivial and thus does not provide sufficient distinction between the claims.

It is noted that this application is practically a duplicate of applicant's case having Serial Number 311,754, filed Dec. 30, 1939. Applicant is required to maintain a line of division between the subject matter claimed in the two applications. See ex parte Smith 44 O.G. 1183; 1888 C. D. 131.

L. C. McCANN
Examiner.

96 Div. 30 Room 4078 U. S. Patent Office

Paper No. 4

Mail Division Jun 20 1941 U. S. Patent Office

Jun 21 1941 Division 30

In the United States Patent Office

Applicant: Frederick C. Leonard
Ser. 362,045
Filed: October 21, 1940
For: Thermostatic Mixing Valve

Providence, R. I.
June 19, 1941

Hon. Commissioner of Patents
Washington, D. C.

Sir:

In response to the Office Action of January 15, 1941, please amend the above-entitled application as follows:

Please cancel the claims and insert instead;

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed (fluid) outlet, and

a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

97 12. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; (the ends of said valve being tapered), said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

98 13. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other por-

tion (at least one end of said valve seat having a limit stop for said valve) said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

99 14. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger, and said valve having a stem universally connected to said finger.

100 15. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a

tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger having an enlarged tip, and said valve having a cylindrical stem provided with an elongated slot for said finger and housing the enlarged tip thereof.

101 *Remarks*

The claims have been carefully reviewed and rewritten in view of the Examiner's letter.

The rewritten claims are specific to applicant's construction, including the use of the entire valve body as the mixing chamber, the mounting of the tubular valve so that its wall opening passes the fluids directly to the mixing chamber without prior mixing, and the positioning of the thermostat in a side recess or pocket of the body out of the path of direct exit flow.

The reference Leonard is not pertinent, as Leonard 2,175,203 discloses a valve which has a mixing chamber as part of the valve, a construction obviously not suitable for large capacity valves, and Leonard No. 2,110,884 has a small mixing chamber which directs the flow through the thermostat and then past a partition to the outlet. No reference discloses a valve which passes both hot and cold water direct through the main body to the outlet through a single valve opening; this specific construction permits a large capacity flow which is not otherwise obtainable.

Favorable action and allowance are respectively requested.

Respectfully submitted

FREDERICK C. LEONARD

By NATHANIEL FRUCHT

102 Mailed Aug 13 1941

Div. 30 Room 4078 ADS:RN Paper No. 5

Department of Commerce
United States Patent Office
Washington

Applicant: F. C. Leonard
Ser. No. 362,045
Filed Oct. 21, 1940
For Thermostatic Mixing Valve

N. Frucht
Hospital Trust Bldg.
Providence, R. I.

Responsive to amendment filed June 20, 1941.

Additional reference cited as of interest:

Leonard (3)	1,957,276	May 1, 1934	236-12

Claims 11 to 15 inclusive, have now been presented, all previously considered claims having been canceled.

Claims 11 and 12 are rejected as lacking invention over Leonard (2) as applied to claims 9 and 10 in the preceding office action. Clearly the wall ports 24 of the reference Leonard (2) are closely adjacent the partition 22, and the thermostat is somewhat offset from the axis of the valve and outflow port. To offset the thermostat still more, if it is found that the position shown interferes with the flow of water more than is desired, is a trivial and obvious mechanical expedient. Young and Johnson, of record, show that it is old to fully offset the thermostat from the direct line of flow in a mixing valve. The use of tapered ends on the Leonard (2) valve is also an obvious expedient as shown to be old by Henneuse and Leonard (1) of record.

Claim 13 is rejected on the same grounds as claims 11 and 12. The valve 26 of Leonard (2) will obviously
103 be stopped by contact with each of side walls 14 and 15. However, if it is desired to stop the valve before it reaches either of said side walls, no invention is required to provide a stop for such purpose. See Leonard (3) which is cited merely as a single example to show that such stop means are old in the mixing valve art.

Claims 14 and 15 are rejected on Leonard (2) as applied to claims 11 to 13 inclusive. These claims read more clearly upon Leonard (2) than upon applicant's device in which the inner end of the thermostatic coil is not manually settable, nor the outer end of the thermostatic coil provided with a finger. See the paragraph of the specification beginning on line 22 of page 4 which points out that applicant's thermostat has its inner end keyed to the hub 36 which bears arm 35 which in turn operates the valve. However, even if the claims were amended to be accurate in this respect it would not be patentable over Leonard (2) in view of Leonard (1). There would be no invention in substituting the thermostat and valve operating knob of Leonard (1) for the substantially equivalent members of Leonard (2). It is immaterial as to patentability whether the knob of either Leonard (1) or Leonard (2) operates in a circular groove or a cylindrical groove as shown by Kenney.

The claims in this case do not differ substantially from the claims in the applicant's prior case, S. N. 311,754 filed Dec. 30, 1939. For instance, claim 11 is substantially identical in subject matter to claim 24 of the prior application. It is noted that the present application contains no reference to this prior application (which has a disclosure practically identical with this application) as required by Rule 43, Rules of Practice.

104 Applicant is reminded that the drawing requires correction and that the oath as filed is informal as pointed out in the preceding office action.

Since the claims now presented do not avoid the references and grounds of rejection previously applied, this action is made final.

The final rejection herewith closes the prosecution of the case before the Primary Examiner. Any amendment or request for reconsideration which on inspection is found to require reexamination of the case will not be entered, but if promptly filed, may be given consideration a reasonable time prior to the expiration of the statutory period. (See Ex parte Peterson 1928 C. D. 31).

A. BISHOFF
Actg. Examiner.

105 Mail Division Feb 11 1942 U. S. Patent Office

Board of Appeals Feb 12 1942 U. S. Patent Office

U. S. Patent Office Paper No. 6 Feb 16 1942 Division 30.

Appeal No. 42297

Feb-11-42 127776 L Check— 15.00

In the United States Patent Office

Applicant: Frederick C. Leonard
Ser. No. 362,045
Filed: October 21, 1940
For: Thermostatic Mixing Valve

Providence, Rhode Island
February 10, 1942

Hon. Commissioner of Patents
Washington, D. C.

Sir:

The applicant herewith appeals from the decision of the Examiner in the Office Action of August 13, 1941, on the references and for the reason of record.

An oral hearing is requested.

A check for $15.00 for the appeal fee is enclosed herewith.

Respectfully submitted

FREDERICK C. LEONARD

By NATHANIEL FRUCHT
His Attorney

106 U. S. Patent Office Mar 30 1942 Mailed

Department of Commerce
United States Patent Office
Richmond, Va.

Div. 30
ADS:HEM

Paper No. 7

Before the Board of Appeals
On Appeal

In re application Frederick C. Leonard
Serial No. 362,045
Filed: Oct. 21, 1940
Title: Thermostatic Mixing Valve

Examiner's Statement

This is an appeal from the final rejection of claims 11 to 15, inclusive, all the claims in the case.

The claims:

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said

valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

12. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening ex-
107 tending on both sides of the partition and over said
wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; the ends of said valve being tapered, said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

13. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports

when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; at least one end of said valve seat having a limit stop for said valve, said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

14. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of tempearture of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger, and said valve having a stem universally connected to said finger.

108 15. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central par-

tition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger having an enlarged tip, and said valve having a cylindrical stem provided with an elongated slot for said finger and housing the enlarged tip thereof.

The references relied upon:

Leonard	2,175,203	Oct. 10, 1939
Leonard	2,110,884	Mar. 15, 1938
Leonard	1,957,276	May 1, 1934
Johnson	1,127,627	Feb. 9, 1915
Young	2,122,600	July 5, 1938
Henneuse	1,845,499	Feb. 16, 1932
Kenney	1,980,624	Nov. 13, 1934

Applicant's device is a thermostatic mixing valve which has a body, or "base", 11 having an inlet opening 14 (figure 3) for hot fluid and an inlet opening 15 for cold fluid. A tubular valve seat 21 having a central partition 22 and outflow ports 23 and 24 for the hot and cold fluids respectively is mounted between and in direct communication with the inlets 14 and 15.

Surrounding the tubular seat 21 is a tubular valve 26 having two central flow openings 27 which are sufficiently wide

to allow flow from both inlets. The ends 28 are bevelled, it being stated that such bevelling eliminates surging. The valve is provided with a tubular stem 30 having a
109 longitudinal slot 31 for receiving the ball end 32 of an operating lever 33. The lever 33 (figure 2) is attached to an extension plate 35 integral with a hub 36 rotatably mounted on a second hub 37 which in turn is mounted on a fixed shaft 38 threaded into the plate 12. A thermostatic coil 39 has "its inner end 40 keyed to the hub 36 and its outer end 41 secured to an arm 42 which is preferably integral with the hub 37" which is keyed to a gear 43. A smaller gear 44 is keyed to the reduced inner end of a control shaft 45, and meshes with the gear 43. Movement of the gear 44 by means of handle 46 shifts the outer end of the thermostat to change the temperature setting in an obvious manner. The thermostat and valve operating mechanism being located close to the plate 12 is said to provide "an unusually free flow for the hot and the cold fluids from the inlets to the outlet."

This device acts in the usual manner of thermostatic fluid mixing valves, i. e., when the temperature of the mixture becomes too high the thermostat acts to shift the valve so that more cold water is admitted through ports 24 and less hot water through ports 23—and in the opposite direction if the temperature drops too low.

The Reference Leonard 2,175,203 shows a thermostatic mixing valve having a body 10, with inlet openings 11 and 12 for the hot and cold liquids respectively. Tubular valve seat 19, having a central partition 22, and outflow ports 24 and 25 for the hot and cold fluids respectively is mounted between and in direct communication with the inlets 11 and 12. Surrounding the tubular seat 21 is a tubular valve 26 having a central flow opening 27 with three outlets 28. The valve 26 is provided with "spaced annular upstanding flanges 32 formed on the exterior surface". A
110 thermostatic coil 39 has its inner end 33 seated in a slot in a manually adjustable control shaft 35. The

outer end of the thermostat carries a ball ended finger 31 which extends between the flanges 32 so that thermal movement of the thermostat may shift the valve 26 to vary the relative flows through ports 24 and 25 and maintain the temperature of the mixed water substantially constant.

The reference Leonard 2,110,884 (see figures 1 to 6 inclusive) shows a thermostatic mixing valve having inlets 18 and 19 (figure 4) and a tubular valve seat 28 having a central partition 29 and outflow ports 30 and 31 (figure 6) which cooperate with the tapered or conical ends 33 of tubular valve member 32 having the circumferential groove 34 which receives the ball end of lever finger 48 of thimble 46 which is secured to the inner end of thermostatic element 35 which has its outer end attached to the end 44 of arm 43 which is manually adjustable by handle 49 acting through the shaft 36. The operation of this device will be obvious.

The reference Leonard 1,957,276 was cited merely to show that it is old to provide stop pins to limit movement of a mixing valve. See figures 13 to 15 for example which show stop pin 93 which cooperates with projections 90 of the slot 92 on the lower end of the rotatable tubular valve, or "hub", 86, to limit the movement given to the valve by the thermostat. Attention is also directed to the modification shown in figures 16 and 17 wherein a stop pin 112 cooperates with lugs 110 and 111 on the rotatable plate valve 107 to limit the rotation thereof which is effected by a thermal element. It will be noted of course that the valves in this reference are rotatable rather than reciprocatable as in the other Leonard patents cited. However, the use of stop
111 means on any type valve is an obvious expedient.

The references Johnson and Young were cited merely to show that it is old in the art to place the thermal element of a thermostatic mixing valve in a recess so that it is offset from the direct flow of the mixed liquid. The Johnson thermal element and valve structure are obviously different from applicant's valve but the operation is similar and will be clearly understandable from the drawings.

The reference Henneuse shows a thermostatic mixing valve having inlet connections 5 and 6 each of which connects with long and narrow valve ports 15 located on opposite sides of the projection 10. A reciprocatable valve 16 having spaced legs 17 with oppositely opposed flat faces 18 engages opposite faces 11 and 12 of the projection 10, the width of the valve being equal to the distance between the ports 15 on one side of the projection 10 plus the width of one of the ports so that relative movement of the valve will cause one pair of ports 15 to be completely open when the other is completely closed. The "U" shaped bimetal element 27 acts, upon temperature change, to reciprocate the valve 16 between the ports to proportion the flows of hot and cold water to correct the temperature of the mixed water. It will be noted from the drawings that the ends and sides of the valves are definitely tapered. Attention is also directed to the stop pins 43 located on opposite ends of the valves which are for the purpose of "restraining or limiting excessive movement of the valve 16 which might otherwise occur during the initial setting of the regulator."

112 The reference Kenney was cited merely to show that it is old in the art to reciprocate a mixing valve 38 (of figure 6) by means of an arm 39 having a cylindrical groove therein (clearly shown at the lower end of the arm 39) which receives the ball 15 on the end of the thermostatically operable rod 16.

Claims 11 to 15 inclusive were rejected as lacking invention over Leonard 2,175,203 especially in view of one or more of the secondary references as specifically set forth below. The following tabulation will serve to show the points of similarity and differences between the application and the reference Leonard 2,175,203.

Elements of Claim 11	Application	Leonard 2,175,203 patent
(a) A body constituting a mixing chamber	11-12	10
(b) Spaced aligned hot and cold fluid inlets	14-15	11-12
(c) Mixed fluid outlet	54	13
(d) Tubular valve seat	21	19
(e) Central partition	22	22
(f) Ports closely adjacent the partition	23-24	24-25
(g) Tubular valve	26	26
(h) A wall opening extending on both sides of the partition and over the ports	27-27	27-28
(i) A recess in the body at one side of the mixing chamber out of the direct flow of the fluid	(No reference Numeral) See the left side of the body in Fig. 2.	(No reference Numeral) See the left side of the body in Fig. 4
(j) A thermostat mounted in the recess and operatively connected to move the valve	39	30

113 It will be seen that each of the elements a, b, c, d, e, f, g and j of the application clearly finds its full equivalent in the patent. The only possible differences are then in the elements h and i. Applicant contends that the wall opening 27 of Leonard 2,175,203 is a mixing chamber and thus not comparable to the wall openings 27 of the applica-

tion. The examiner believes that the openings 27 and 28 of the patent together provide the full equivalent of the openings 27-27 of the application. It is true that the openings 28 of the patent are of less extent in area than the opening 27 of the patent. However it is obvious that the flow from the ports 24-25 of the patent to the chamber housing the thermostat is substantially as direct as the flow from the ports 23-24 of the application to the chamber housing the thermostat therein. Furthermore, it seems quite obvious that if more flow is desired through the patent device, than the openings 28 will pass they may be enlarged to any degree desired without the exercise of invention. This would merely reduce the amount of mixing taking place in the space 27 and increase the proportion of mixing occurring after the fluids leave the valve. Such would be an obvious result to one of nominal skill in the art. The only other possible distinction is in the recitation that the thermostat is in "a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports (27) to the mixed fluid outlet." It will of course be noted that the thermostat 30 of the patent is not aligned with the axis of the valve (see figure 4) and thus is somewhat offset from the axis of the valve and outflow port 13. To offset the thermostat still more, if it is found to interfere with the flow of water (or vice versa) would appear to be an obvious mechanical expedient. Young and Johnson each show that it is old in the art to fully offset the thermostat from a
114 direct line of flow through a thermostatic mixing valve. To thus offset the Leonard 2,175,203 would involve no more than a minimum of mechanical skill and would not appear to produce any new or unexpected result.

Claim 12 differs from claim 11 only in reciting that the ends of the valve (26) are "tapered". Such limitation is not thought to provide a patentable distinction over Leonard 2,175,203 wherein the ends of valve 26 appear to be slightly rounded or tapered. Further rounding or tapering would seem to be an obvious expedient as suggested by each of Leonard 2,110,884 and Henneuse in which the reciprocating valve members clearly have their ends tapered.

Claim 13 differs from claim 11 only in reciting "at least one end of said valve seat (21) having a limit stop (25) for said valve" (26). Such limitation does not appear to define over Leonard 2,175,203 in which the valve 26 will obviously be stopped satisfactorily by each of side walls 14 and 15. However, if it is desired to stop the valve before it reaches either of said side walls no invention would be required to provide separate stop means for such purpose. See each of Henneuse and Leonard 1,957,276 which show that it is old to provide stop pins to limit the movement of mixing valves. In Henneuse the pins 43 limit reciprocation of the valve in both directions. In Leonard 1,957,276 figure 13, for example, pin 93 limits rotation of the valve 86 in both directions.

Claim 14 differs from claim 11 only in adding "said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger, and said valve having a stem universally connected to said finger." Applicant's attention was called to the fact that this limitation reads more clearly upon Leonard 2,175,203
115 than upon the device of the application since in the
application the inner end of the thermostatic coil 39 is not manually settable, nor the outer end of the thermostatic coil provided with a finger connected through a stem to the valve. See the paragraph of the applicant's specification beginning on line 22 of page 4 which points out that applicant's thermostat has its inner end keyed to the hub 36 which bears arm 35 which in turn operates the valve. It is the outer and not the inner end of the thermostatic coil that is manually settable in the application. However, even if the claim had been amended to be accurate in this respect it would not be patentable over Leonard 2,175,203 in view of Leonard 2,110,884 in which manual adjustment of the outer end of a thermostatic spiral is shown to be the full equivalent of manual adjustment of the inner end.

Claim 15 differs from claim 14 only in stating that the finger of the universal connection has an "enlarged tip" and the valve (26) has a cylindrical stem provided with an elongated slot for the finger. Such mechanical connection does not appear to define over either Leonard 2,175,203 or Leonard 2,110,884 in which the enlarged tips 31 and 48 respectively operate in circular grooves which appear to be the full equivalent of cylindrical grooves such as shown by applicant and in the prior art by Kenney.

Applicant attempts to define over the reference Leonard 2,175,203 by small structural differences which would appear to be obvious to one of ordinary skill in the art and it is believed that the final rejection of claims 11 to 15 inclusive thereon was proper.

116 This application is a substantial duplicate of applicant's copending application S. N. 311,754 wherein the claims were finally rejected on the same reference as used herein and which application became abandoned on Feb. 12, 1942.

L. P. McCANN
Examiner.

117 Paper No. 8

Department of Commerce
United States Patent Office
Washington

April 2, 1942

Sir:

The case of Frederick C. Leonard
(Appeal No. 42,297)

Serial No. 362,045, will be heard by the Board of Appeals on the 9th day of June, 1942

The hearings will commence at 9.30 A. M. and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Inter partes appeals: Interlocutory and final hearings when no testimony has been taken, thirty minutes each side; final hearing when testimony has been taken, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in inter partes cases, and in such cases a full and fair opening must be made.

Briefs in inter partes appeals must be filed in accordance with the provisions of Rules 144 and 163, as amended.

Respectfully,

CONWAY P. COE
Commissioner of Patents.

To
Mr. Nathaniel Frucht,
Hospital Trust Bldg.,
Providence, R. I.

118 Board of Appeals Jun 9 1942 U. S. Patent Office

Mail Division Jun 9 1942 U. S. Patent Office

Nathaniel Frucht
Patent Lawyer
506 Hospital Trust Building
Providence, R. I.

June 6, 1942

Nathaniel Frucht
Max Schwartz

Applicant: Frederick C. Leonard
Ser. No. 362,045
Filed Oct. 21, 1940
For Thermostatic Mixing Valve

Hon. Commissioner of Patents
Richmond, Virginia

Sir:

Appeal No. 42,297 is set for hearing June 9, 1942. It is not possible for applicant's attorney to attend, and the enclosed brief is therefore forwarded for favorable consideration, the oral hearing being waived.

Respectfully,

NATHANIEL FRUCHT

NF/t
Enc.

119 Div. 30

Board of Appeals Jun 9 1942 U. S. Patent Office

Mail Division June 8 1942 U. S. Patent Office

In the United States Patent Office

Before the Board of Appeals
Appeal No. 42,297

Applicant: Frederick C. Leonard
Ser. No. 362,045
Filed Oct. 21, 1940
For Thermostatic Mixing Valve

Providence, Rhode Island
June 5, 1942

Brief on Behalf of Applicant

Hon. Commissioner of Patents
Richmond, Virginia

Sir:

The applicant appeals from the final rejection of Claims 11 to 15.

The invention relates to thermostatic mixing valves, and is specific to a construction for large flow capacity, such as for example 10,000 gallons per hour (specification, page 3). As stated in the description, "such valves require maximum port openings, minimum interference with free fluid flow, and elimination of internal disturbances such as surging".

The history of the thermostatic art shows that the operation of the valve is materially affected by what at first sight appear to be minor constructional changes. This is so because the thermostatic action of a bimetallic element is slight, for producing the necessary response to a
120 small temperature change, and flow conditions of hot
and cold and mixed fluid create entirely different effects on a thermostat when the volume is greatly increased.

The construction of an operating thermostatic valve of large capacity is not, therefore, a minor variation of previous valve structures, but is the outgrowth of an inventive approach to the new conditions arising from such large flow capacities.

It is thus necessary to establish what features are required to provide a valve operative for such large flow capacities; and these features are, first, that the entire body of the valve constitutes the mixing chamber; second, that the inflow ports leading the hot and the cold fluid into the body of the valve be as close together as possible; third, that the valve opening be over both inflow ports when the valve is central; fourth, that the hot and cold fluids flow directly into the body of the valve; and fifth, that the thermostat be mounted in the valve body but out of the path of direct flow of the fluid to the outlet.

The application drawings disclose a body 10, 11 with inlets 14 and 15 for hot and cold water, the inflowing water entering a tubular valve seat with a central partition and inflow ports 23, 24 closely adjacent the partition; a tubular slide valve 26 is mounted in the valve seat and has valve

openings 27 extending over the ports 23, 24, the hot and cold
fluid passing separately into the valve body 10, 11
121 and mixing therein while flowing directly to the outlet 54.
The valve body has a lateral recess at one side, out of the direct path of flow of the mixing fluids, in which a thermostat 40 is mounted to shift the valve 26 and thus change the relative proportions of the hot and the cold fluids entering into the body of the valve.

The five features, if considered individually, are apparently minor points; but the combination of these five features produces an accurate, sensitive thermostatic mixing valve of large capacity; and these five features are specified in the claims. Claim 11 is representative, and is copied herewith to bring out these five features as claimed.

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

122 It is now pertinent to consider the base reference,
applicant's own patent No. 2,175,203. The patent discloses a body 10, which is not a mixing chamber, spaced aligned hot and cold fluid inlets 11, 12, a mixed fluid outlet

13, a tubular valve seat 19 having a central partition 22, outflow ports 24, 25 which are of relatively small area as compared to the claimed ports and are not as closely adjacent the partition, a tubular valve 26 having a recess 27 which is a mixing chamber, this mixing chamber having outflow port 28, and a thermostatic control 30 which is directly in the path of the previously mixed fluid, as shown in Fig. 4 of the drawings, the upflowing water directly impinging on the thermostat.

The Examiner has carefully listed the elements of the application and of Leonard patent No. 2,175,203 on page 7 of the Examiner's statement. The alleged correspondence is not correct. Element 10 of the reference is not a mixing chamber, and does not correspond to applicant's elements 11, 12; elements 27, 28 of the reference are not "a wall opening extending on both sides of the partition and over the ports", and instead is a mixing chamber recess with inlets and outlets; the outlet ports 28 are not over the inflow ports 24 when the valve is central; and the Examiner has omitted the next phrase of the claim, which is "said openings permitting direct flow of fluid from said wall ports into the mixing chamber". Further, the recess in
123 which the thermostat seats in Fig. 2 of the application is at the side of the valve, so as to be out of the direct line of fluid flow to the outlet 54, whereas the thermostat in Fig. 4 of the reference is above the valve, and in the direct path of flow of the fluid.

It is thus clear that the reference Leonard patent lacks the following structural features specified in the claim (the letters corresponding to the Examiner's statement, page 7).

a. The valve body is the mixing chamber;

f. the valve seat inflow ports are closely adjacent the partition;

h. the valve opening is over both inflow ports when the valve is central;

(x). the hot and cold fluids pass directly into the body of the valve;

i, j. the thermostat is not in the path of direct flow of fluid to the outlet.

These features, however, are the very features which make the large capacity thermostatic valve operative; and these features are not shown in the cited art except in isolated form which cannot be assembled into one structure except in the light of applicant's disclosure.

The Examiner did not recognize the differences a, f, and x; differences h and i only are discussed. Thus, the Examiner, page 8, states that applicant contends that the wall
opening 27 of the Leonard patent is a mixing cham-
124 ber; but this is not correct, as 27 is an annular recess
which receives both hot and cold fluid, the mixed fluid flowing out through valve ports 28. This is admitted, lines 17, 18, page 8 of the statement, wherein the Examiner alleges that enlarging openings 28 "would merely reduce the amount of mixing taking place in the space 27". But there is obviously a difference in operation if the thermostat is subjected to mixed fluid or to mixing fluid; a mere enlargement of the ports and the annular recess will not produce an operative large capacity valve.

The Examiner then discusses the thermostatic recess claimed; and states, lines 26, 27, that the thermostat of the patent "is somewhat offset from the axis of the valve". His thought seems to be that the offsetting is for the purpose of eliminating interference with the flow of water (lines 4, 3 from bottom of Page 8) and that any offset thermostat such as shown in Young or Johnson is pertinent. Yet the reason for applicant's specific positioning of the thermostat is clear; it should be removed as far as possible from mixing fluid. Whereas in the Leonard patent the flow capacity is small and the fluid is mixed in the annular recess before it emerges into the body of the valve and contacts the thermostat, in the application invention the flow requirements make it necessary to mix in the valve body; and the position claimed for the thermostat thus becomes an essential feature in combination with the other claimed features.

125 The error of the rejection is thus believed explained; the combination of elements of the claim requires specific cooperating features for the elements, and the cited art neither discloses this specific combination nor the specific cooperating features defined.

The allowance of Claims 12, 13 and 14 is not urged, although they merely add further limitations to the basic structure of Claim 11. The allowance of Claim 15 is urged, however, as this claim adds the specific universal connection found desirable in connection with the lateral mounting of the thermostat, as follows:

"said valve having a cylindrical stem provided with an elongated slot"—"housing the enlarged tip" (of the finger at the end of the thermostat). The reference patents No. 2,175,203 and 2,110,884 have annular grooves in which the enlarged tip is received; and do not disclose the specific cylindrical stem with an elongated slot which is required by applicant.

Allowance of Claims 11 and 15 is therefore respectfully requested.

Respectfully submitted,

FREDERICK C. LEONARD
By NATHANIEL FRUCHT
his Attorney

126 Mailed Jun 23 1942

Appeal No. 42,297 Paper No. 10 MEM

In the United States Patent Office
Before the Board of Appeals.
Ex parte Frederick C. Leonard

Application for patent filed October 21, 1940, Serial No. 362,045. Thermostatic Mixing Valve.

Mr. Nathaniel Frucht for applicant.

This is an appeal from the action of the examiner finally rejecting claims 11 to 15, inclusive.

Claim 11 is illustrative and reads as follows:

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

The references relied upon are:

Johnson, 1,127,627, February 9, 1915,
Henneuse, 1,845,499, February 16, 1932,
127 Leonard, 1,957,276, May 1, 1934,
Kenney, 1,980,624, November 13, 1934,
Leonard et al, 2,110,884, March 15, 1938,
Young, 2,122,600, July 5, 1938,
Leonard, 2,175,203, October 10, 1939.

The invention is a thermostatically controlled hot and cold water mixing valve. The construction is fully set forth in the above claim.

The examiner has cited three Leonard patents. Two of these patents disclose constructions which are quite close to what appellant is claiming. The patent No. 2,175,203 is believed to be the most pertinent.

Appellant argues that it shows no mixing chamber but we think it does. The housing clearly forms a chamber in which the hot and cold water streams are mixed. The patent does not show the thermostat arranged in a recess so it will not be in the main line of flow to the otulet. However Johnson and Young cited show this feature and no invention would be involved in incorporating this feature into the Leonard patent. The Leonard patent No. 1,957,276 discloses the use of limiting pins for the valve disk. Hence no invention is involved in providing such pins to limit the movement of the sleeve valve in patent No. 2,175,203.

There appears to be no feature included in any claim which is not fully disclosed in the art cited. To embody features of other patents into the Leonard patents particularly No. 2,175,203, so as to meet the claims is regarded non-inventive.

The decision of the examiner is affirmed.

E. T. MORGAN,
Examiner-in-Chief
F. P. EDINBURG,
Examiner-in-Chief
C. H. SHAFFER,
Examiner-in-Chief
Board of Appeals.

June 23, 1942
Mr. Nathaniel Frucht,
Hospital Trust Bldg.,
Providence, R. I.

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128 Mail Division Jul 13 1942
Board of Appeals Jul 14 1942
In the United States Patent Office
Before the Board of Appeals
Applicant: Frederick C. Leonard
Ser. No. 362,045
Filed October 21, 1940
For Thermostatic Mixing Valve

Request for Reconsideration

The Board is respectfully requested to reconsider this appeal, on the ground that there is apparently a misunderstanding of the structure of the invention as compared to the main reference, Patent No. 2,175,203.

The point requested reconsidered is thus: the applicant uses the entire housing as his mixing chamber; if the thermostatic coil were positioned in the path of flow of the mixing water, there would be continual impacts of both hot and cold streams on the coil, with resultant chattering of the coil and the inflow control valve. It is therefore necessary, with a housing in which mixing takes place, to provide a laterally disposed recess to take the thermostatic coil out of the direct path of flow.

It may thus be taken that the inventor, in order to obtain a large capacity of flow, must mix in the entire housing; and thus, to obtain an accurate temperature control, must position his thermostat out of the path where it would be subjected to impacts of both hot and cold streams. If we now examine Fig. 2 of applicant's drawings, it will be evident that that is exactly what the inventor has done.

129 Now, however, if we examine the base reference No. 2,175,203, it is evident that the situation is entirely different. The mixing occurs in the annular channel, and not in the main body of the housing, the reason for this being that the actual flow volume is much smaller, and does not therefore require a large mixing chamber. The hot and cold fluids pass up through ports 24 and into the chamber 27, where they mix, the mixed fluid then flowing out through ports 28, and contacting the thermostatic coil. The ports 28 are displaced with respect to the ports 24, see Fig. 4 of the reference, to permit this mixing to occur. Under these circumstances, there is no need for positioning the thermostatic coil so as to be out of the path of direct flow, as there cannot be any impacts of separate hot and cold streams. The base reference therefore completely lacks the applicant's inventive concept, and completely

lacks the structure found necessary to carry out this concept of providing an accurate control for very large flows.

Because of this, the addition of Young or Johnson is of no avail. Nor do these references per se disclose applicant's concept or structure. In Young, the hot water and the cold water each emerge in horizontal streams towards the sides of the housing, see Fig. 2, and then move upwardly, so that they are thoroughly mixed, (specification, page 2, lines 16, 17) and the thermostat is subjected to the temperature of the mixed fluid (specification, page
130 2, lines 18 to 20). It is not possible for a hot or a
cold stream to hit the thermostat; nor is the coil in a recess out of the path of flow from the inlets to the outlet.

Johnson is also not pertinent. The flow of hot and cold fluids is downward, because of the taper of the wedge shaped valve 17, and is also opposed to produce an immediate mixing impact, (see Claims 3 and 5 of the reference) and thus mixture occurs mainly at the bottom, in the cup base, and the bellows valve 9 is thus also subjected to a mixed fluid.

The claims structurally define these differences. Thus, Claim 11 defines the entire body as the mixing chamber, thus differing completely from the Leonard patent No. 2,175,203, and further specifies that the thermostat is in a recess out of the direct path of flow of the fluid. This base reference cannot be modified by means of the other references cited, as the use of the entire body of Young or Johnson destroys the annular mixing chamber which is the essence of the base reference invention; and the shifting of the coil to a side pocket, note Johnson, is without effect on patent No. 2,175,203, as the fluid which engages the coil in the base reference is already mixed.

131 Perhaps the last sentence more clearly explains
the difference. In patent No. 2,175,203, the coil could be placed anywhere in the housing, as it would always be subjected to mixed fluid. In the application, the claimed valve structure is such, that the coil must be placed in a

recess to obtain temperature regulation. There is therefore a combination between the valve structure and the position of the coil that is necessary, and is novel. The specific claims should be allowed.

Allowance is respectfully requested.

Respectfully submitted,

FREDERICK C. LEONARD,
By NATHANIEL FRUCHT,
his Attorney.

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132 Mailed Jul 21 1942

Appeal No. 42,297 Paper No. 12 OB

In the United States Patent Office
Before the Board of Appeals
Ex parte Frederick C. Leonard

Application for Patent filed October 21, 1940, Serial No. 362,045. Thermostatic Mixing Valve.

Mr. Nathaniel Frucht for appellant.

On Request for Reconsideration.

Appellant requests reconsideration of our decision. He particularly emphasizes the arrangement of the thermostat in a recess offset to one side of the chamber. This feature is old in Johnson and hence it would not be inventive to modify other patents in the same manner.

The request for reconsideration is denied.

E. T. MORGAN,
Examiner-in-Chief
F. P. EDINBURG,
Examiner-in-Chief
C. H. SHAFFER,
Examiner-in-Chief
Board of Appeals

July 21, 1942
Mr. Nathaniel Frucht
Hospital Trust Bldg.,
Providence, R. I.
133 Mail Division, Jul 22 1942
Board of Appeals Jul 23 1942
In the United States Patent Office
Before the Board of Appeals, Appeal No. 42297
Applicant Frederick C. Leonard
Ser. No. 362,045
Filed October 21, 1940
For Thermostatic Mixing Valve

Providence, Rhode Island
July 16, 1942

Affidavit Supplementing Request for Reconsideration

Nathaniel Frucht, of Providence, Rhode Island, attorney for the applicant, herewith states under oath:

1. That he visited the applicant at the plant of the Leonard Valve Company, Providence, Rhode Island, to explain the decision of the Board of Appeals to the applicant.

2. That the applicant, who is recognized as a pioneer in the thermostatic valve art disclosed that the experiments leading to the successful structure disclosed in the application covered a period of at least two and one-half years, and that at least nine different working models were manufactured and tested by the applicant and the foreman of the experimental department, at an experimental cost exceeding Five Thousand Dollars, before the particular construction which renders the device of the application operative was determined. This, despite the fact that the base reference relied upon by the Examiner was the applicant's own invention, which had been very successful for thermostatic valves having a limited flow capacity, but which proved entirely impractical for large flow capacities such as referred to in the specification of the present application.

134 3. That the applicant thereupon requested his attorney to explain to the Board of Appeals that a substantial increase in flow introduces new effects which require a prolonged study and extensive investigation before the exact relation of structure elements is established, which is operative under the new conditions, and that it is necessary to try many different arrangements before the features that provide smooth and accurate operation of the thermostatic control are established. That the prior art, in applicant's experience, merely constitutes a guide for facilitating experimentation, as experience has shown that any substantial variation in operating conditions requires detailed research to provide an adequate solution for the changed problem.

NATHANIEL FRUCHT

Sworn to before me this 16th day of July, 1942, at Providence, Rhode Island.

HAILES L. PALMER,
Notary Public.

135 Mailed Jul 30 1942

Appeal No. 42,297 Paper 14 MM

In the United States Patent Office
Before the Board of Appeals
Ex parte Frederick C. Leonard

Application for patent filed October 21, 1940, Serial No. 362,045. Thermostatic Mixing Valve.

Mr. Nathaniel Frucht for applicant.

On Request for Reconsideration.

Appellant has filed an affidavit and requests reconsideration. The affidavit cannot be considered by the Board of Appeals without remanding the application to the Primary Examiner. After a decision on appeal and application has been rendered, it will not be remanded to the Primary Examiner. The affidavit has therefore not been considered.

The request for reconsideration is denied.

F. P. EDINBURG,
Examiner-in-Chief
E. T. MORGAN,
Examiner-in-Chief
C. H. SHAFFER,
Examiner-in-Chief
Board of Appeals.

Mr. Nathaniel Frucht,
Hospital Trust Bldg.,
Providence, R. I.
July 30, 1942

136 Department of Commerce
United States Patent Office
Washington

Ex parte: Frederick C. Leonard
Serial No. 362,045
Filed: October 21, 1940
For: Thermostatic Mixing Valve

Notice of Civil Action under Section 4915 R. S.

A civil action under Section 4915 R. S. entitled LEONARD VALVE COMPANY and FREDERICK C. LEONARD v. CONWAY P. COE, COMMISSIONER OF PATENTS, Civil Action No. 18,130, involving this application, was filed on December 22, 1942 in the District Court of the United States for the District of Columbia.

W. W. COCHRAN,
Solicitor.

December 22, 1942.

137 Mail Division Dec 30 1942
U. S. Patent Office, Dec 31 1942, Division 30
In the United States Patent Office
Applicant: Frederick C. Leonard
Serial No. 362,045
Filed Oct. 21, 1940
For Thermostatic Mixing Valve

Providence, Rhode Island
December 28, 1942

Hon. Commissioner of Patents,
Richmond, Va.
Sir:

Please recognize Karl Fenning, Esq., of Press Bldg., Washington, D. C., as associate attorney in the above entitled case. All correspondence, however, is to be addressed to me.

Respectfully,

NATHANIEL FRUCHT,

* * * * * * * * * *

Defendant's Exhibit No. 1.

C. F. JOHNSON.
TEMPERATURE CONTROLLED VALVE.
APPLICATION FILED JUNE 18, 1914.

Patented Feb. 9, 1915.

1,127,627.

Fig. 1.

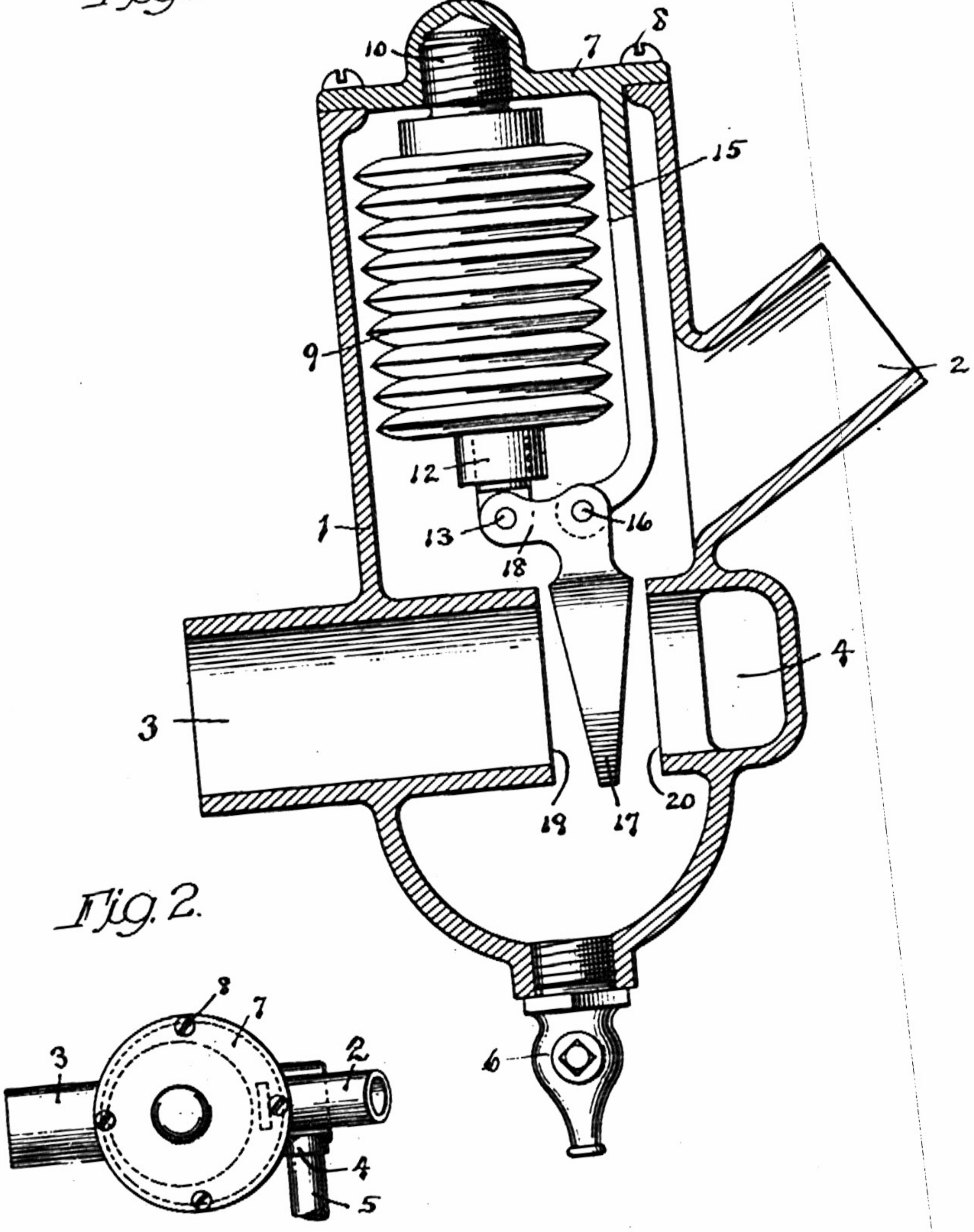


Fig. 2.

Inventor

Chester F. Johnson

Witnesses

L. M. Spencer.
H. W. Kreinbring

By Edward N. Pagelsen.
Attorney

UNITED STATES PATENT OFFICE.

CHESTER F. JOHNSON, OF DETROIT, MICHIGAN.

TEMPERATURE-CONTROLLED VALVE.

1,127,627. Specification of Letters Patent. **Patented Feb. 9, 1915.**

Application filed June 18, 1914. Serial No. 845,749.

To all whom it may concern:

Be it known that I, Chester F. Johnson, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Temperature-Controlled Valve, of which the following is a specification.

This invention relates to means for controlling the mixing of liquids of different temperatures, and its object is to provide a simple and efficient valve which shall be adapted to stop or reduce the flow of a liquid of higher temperature and to permit or increase the flow of a liquid of lower temperature when the mixture of the two liquids is above a predetermined temperature and to have the opposite action when the mixture is below this predetermined temperature.

This invention consists, in combination with a valve body having a plurality of inlets and an outlet, of a valve pivoted in such a manner as to swing freely between the inlets without engaging any portion of the valve body during such movement, thus avoiding friction, and means for swinging said valve, said means comprising a container filled with a medium that expands and contracts as its temperature rises and falls.

In the accompanying drawing, Figure 1 is a vertical section of this improved valve. Fig. 2 is a plan of the same on a smaller scale.

Similar reference characters refer to like parts throughout the several views.

The body 1 of the valve has an outlet 2 extending in any desired direction, an inlet 3 for a liquid of comparatively low temperature, and an inlet 4 for a liquid of higher temperature, a pipe 5 being shown connected to the latter. The bottom of the valve is preferably cup-shaped to receive the drain cock 6 so that sediment may be removed. Vegetable and mineral fibers and other impurities that enter through the inlets, instead of lodging between the valve and its seats and thus interfering with the movements of the valve, will fall into the cup 11. The movements of the valve can be observed by unscrewing the drain cock 6 and looking up into the body 1. A head 7 may be secured to the body by means of screws 8 and may support one end of the thermostat 9, of any desired construction, preferably of thin resilient metal rings, connected as shown in the drawing and having ends 10 and 12, the former connecting to the head 7 and the latter carrying a pivot 13. The container portion of this thermostat is preferably filled with a liquid having a high rate of expansion, such as chloroform, carbon bisulfid or benzole. Extending down from the head 7 is an arm 15, which carries a pivot 16 on which the valve 17 is mounted. An arm 18 on the valve connects to the lower end of the thermostat by means of the pivot 13. This valve is swung against the seat 19 when the liquid within the thermostat contracts, because of the resilience of the metal rings forming the thermostat, and it swings against the seat 20 when the liquid has expanded to a predetermined degree. When the hotter and cooler liquids enter the valve body at such temperatures and in equal amounts that the liquid passing out through the outlet 2 is at a predetermined temperature, the valve 17 may be held substantially central. But if the temperature of the mixture rises, the thermostat will expand and the valve 17 will be swung toward the seat 20, thus reducing the inflow of the hotter liquid and permitting an increase of the flow of the cooler liquid. On the other hand, should the temperature of the water surrounding the thermostat fall, the inflow of the cooler liquid will be reduced by the swinging of the valve toward the seat 19.

The openings through which the liquids flow into the body are shown to be in line with each other. The distance between the seats 19 and 20 will depend upon the thickness of the valve 17, the length of the arm 18, the rate of expansion of the thermostat, and the allowable variation in the temperature of the liquid flowing from the outlet 2.

I claim:—

1. In a control valve, the combination of a body having two inlet passages in line with each other and an outlet passage, a valve pivotally mounted to swing between said inlet passages, and a thermostat within the body connected to the valve to move it toward one or the other passage as the temperature of the medium within the body surrounding the thermostat changes.

2. In a control valve, the combination of a body having an outlet passage and two inlet passages in line with each other, a disk valve mounted between the inner ends of the passages, means to support the valve, an arm

on the valve, a cover for the valve body, and a thermostat within the valve body, consisting of an expansible cylinder, connecting to said arm on said valve and said cover for swinging the valve between said inner ends of the passages as the temperature of the contents of the body changes.

3. In a control valve, the combination of a body, a top for the same, an arm extending down from said top, a valve pivotally mounted on the free end of the arm, a thermostat mounted within the body and connected to the valve to swing the same as the temperature varies, and pipes extending into the body in line with each other and on opposite sides of the valve so that the impacts of the liquids issuing from said pipes on the valve may be substantially balanced, said body having an outlet for the liquids entering through said pipes.

4. In a control valve, the combination of a body having two inlet openings and an outlet opening, a valve pivotally mounted to swing between said inlet openings, and a thermostat within the body connected to the valve to move it toward one or the other opening as the temperature of the medium surrounding the thermostat within the body changes.

5. In a control valve, the combination of a body, an arm within the body, a valve pivotally mounted on the arm, a thermostat mounted within the body and connected to the valve to swing the same as the temperature varies, and pipes extending into the body and on opposite sides of the valve so that the impacts of the liquids issuing from said pipes on the valve may be substantially balanced, said body having an outlet for the liquids entering through said pipes.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHESTER F. JOHNSON.

Witnesses:
EDWARD N. PAGELSEN,
L. M. SPENCER.

Feb. 16, 1932. R. F. HENNEUSE 1,845,499

THERMOSTATIC TEMPERATURE REGULATOR

Filed May 27, 1930

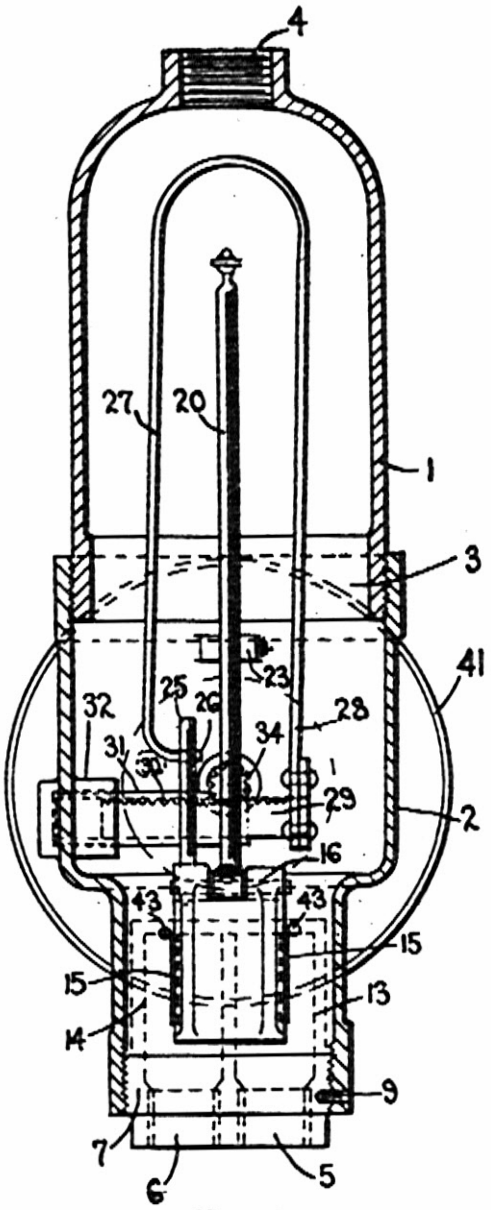


FIG. 1

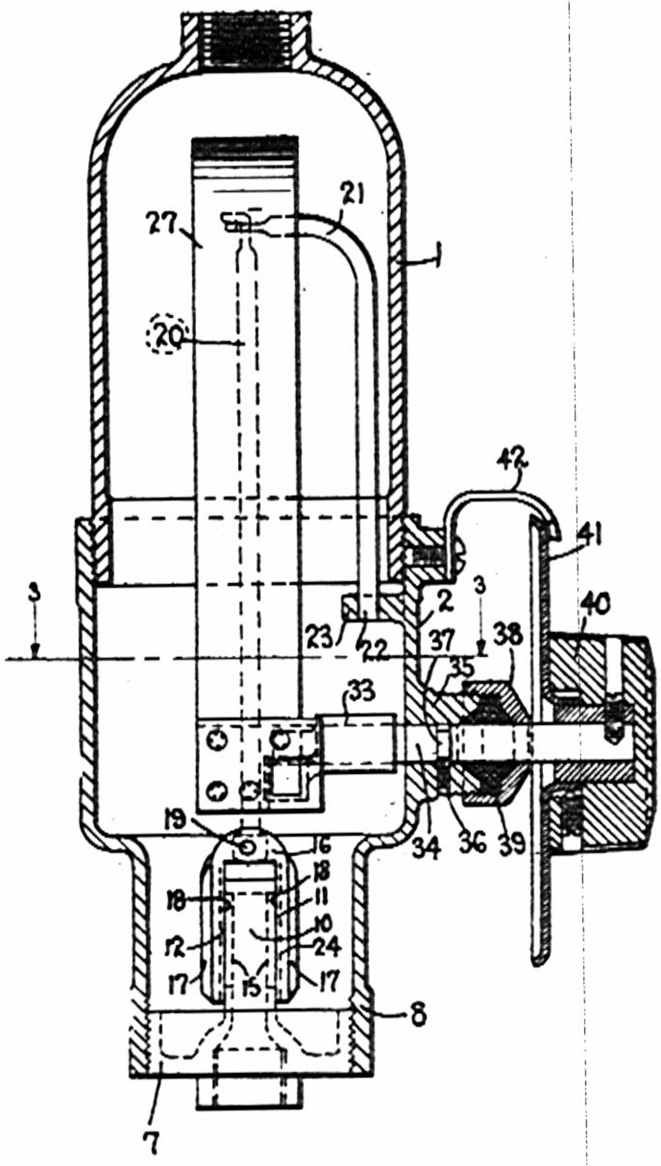


FIG. 2

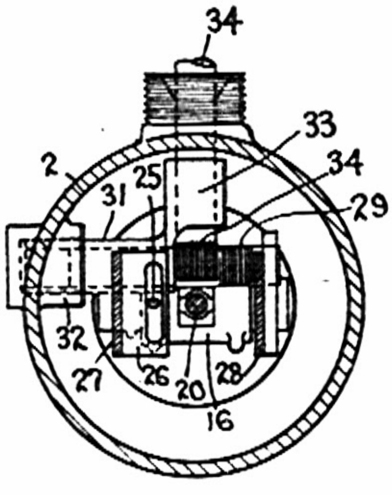


FIG. 3

INVENTOR.
Richard F. Henneuse
BY
Fay, Oberlin & Fay
ATTORNEYS.

Patented Feb. 16, 1932 **1,845,499**

UNITED STATES PATENT OFFICE

RICHARD F. HENNEUSE, OF BUCYRUS, OHIO

THERMOSTATIC TEMPERATURE REGULATOR

Application filed May 27, 1930. Serial No. 456,050.

My invention, relating as indicated to a thermostatic temperature regulator, has specific reference to a thermostatically controlled device for mixing and controlling the temperature of fluids, whether liquid or gaseous. In order that a thermostatically controlled device be usable advantageously for the purpose of mixing relatively hot and cold fluids and simultaneously controlling the temperature of the fluid discharged therefrom according to a predetermined setting of such device, it is necessary that such thermostatic means be regulatable so that fluid of any desired temperature may be discharged therefrom. A further requirement of an efficient thermostatic device is that the several elements thereof be constructed and interrelated so that the thermostatic element employed therein accurately reflects the temperature of the discharging fluid and further, that such thermostatic element be instantly responsive to any minute changes in the temperature of the fluid passing through the device so that a constant temperature of the discharge fluid is maintained at all times.

When thermostatically operated mixing valves are employed in shower baths, and the like, it is necessary that such mixing valve be compact in structure so that it may be mounted in the confines of the wall without the necessity of expensive alterations in the building construction incidental to its installation. It is among the objects of my invention to provide a thermostatically controlled regulator or mixing valve for fluids which shall have all the above named desirable characteristics. Other objects of my invention will appear as the description proceeds. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully explained and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a part sectional, part elevational view of the mechanism comprising my invention; Fig. 2 is a part sectional, part elevation of the mechanism disclosed in Fig. 1, taken on a plane substantially at right angles to the illustration in Fig. 1; and Fig. 3 is a transverse fragmentary part sectional, part elevational view of the structure illustrated in previous figures taken on a plane substantially indicated by the line 3—3 in Fig. 2.

Referring more specifically to the drawings and more especially to Figs. 1 and 2, the thermostatically controlled regulator or mixing valve comprising my invention consists of a substantially tubular body and is formed of separable sections 1 and 2 which are threadably interconnected as at 3 so that disassembly thereof can readily be accomplished for the purpose of inspecting, repairing or making adjustments of the mechanism enclosed in the body. The section 1 has a discharge aperture 4 in one end thereof and the section 2 has inlet ports 5 and 6 in the opposite end thereof.

The inlet ports 5 and 6 are preferably formed in a cylindrical bushing 7 which is threadedly engaged by the reduced portion 8 of the lower section 2 and after assembly a dowel 9 may be employed for the purpose of preventing an uncoupling of the bushing 7 during the subsequent use of the device. The bushing 7 has a substantially rectangular projection 10 extending interiorly of the body 2 which projection has parallel opposite faces 11 and 12 for the purpose hereinafter more fully explained. The projection 10 has pockets 13 and 14 formed therein respectively in communication with the inlet ports 5 and 6. The lateral walls of the projection 10 which have the flat parallel faces 11 and 12 have ports 15 formed therein, which ports are preferably in the form of parallel longitudinal slots.

A valve 16 having spaced legs 17 with oppositely disposed flat faces 18 engages the opposite faces 11 and 12 of the projection 10, the width of such valve, specifically the legs 17 thereof, is preferably equal to the distance between the ports 15 on one side of the projection 10 plus the width of one of such ports, so that upon relative movement of the valve

102

16 with respect to the member 10 when one port is being closed the other port will be opened and when one port is completely closed the other of such ports will be entirely open. With this form of construction a relatively slight movement of the valve 16 effects a substantial control over the fluid discharged through the separate ports. The valve 16 has a pin 19 secured therein, which pin secures the lower terminal of a rod 20 by means of which the valve 16 is supported in proper relation to the projection 10. The supporting rod 20 is movably supported by a bracket 21 which is preferably secured at its lower terminal 22 to a projection 23 formed integrally with the lower member 2. The oppositely disposed faces 18 of the spaced legs 17 may be centrally recessed as at 24 throughout such portion of the valve which is not in contact with the ports so as to reduce the frictional resistance between such valve and the flat faces 11 and 12 of the projection 10.

The valve 16 has an arm 25 projecting upwardly therefrom and preferably formed integrally therewith. The arm 25 is engaged by the transversely slotted terminal 26 of a preferably U-shaped thermostatic element 27 which is positioned centrally in the mixing chamber formed by the members 1 and 2. The opposite terminal 28 of the thermostatic element 27 is secured to a rack 29 which is slidably mounted in an aperture 30 formed therefor in a sleeve 31 which is terminally mounted in a boss 32 and which has a sleeve 33 formed integrally therewith extending substantially at right angles to the axis of the aperture 30. The sleeve 33 has a shaft 34 journaled therein which shaft has a pinion formed on the terminal thereof in mesh with the rack 29. The shaft 34 is likewise journaled in a boss 35 which is adapted to receive a pin 36 which engages a groove 37 in the shaft 34 thereby axially restraining such shaft in the boss 35. A suitable stuffing box comprising an adjustable nut 38 and a packing material 39 may be employed in association with the boss 35 for the purpose of preventing fluid from flowing out of the mixing chamber along the sides of the shaft 34.

The shaft 34 may have an adjusting knob 40 secured thereto for the purpose of rotating such shaft, which knob may have an ordinal bearing disc 41 associated therewith, which disc in cooperation with an indicating arm 42 serves as an index for the temperature at which the device is set.

It will be noted in connection with the above description that the mixing valve comprising my invention is compact in structure and presents structural and operable advantages not found in any devices of this class heretofore employed. The U-shaped thermostatic element 27 has its terminals adjacent so that any looseness of the rack or associated control mechanism will not in any way effect the operation of such thermostatic element in controlling the valve 16. By forming the thermostatic element of a relatively thin band as indicated, such element will respond quickly to minute temperature changes in the fluid in the mixng chamber and consequently maintain constant the temperature of the fluid discharged from the mixing chamber. The thermostatic element position, centrally in the mixing chamber as described, has the further advantage in that the fluids entering such chamber from the inlet ports 15 are thoroughly mixed before coming in contact with such element so that the fluid prior to discharge only affects the temperature of the thermostatic element. The central position of the supporting arm 20 for the valve 16 is desirable from the standpoint of compactness of structure as well as the provision of a support for such valve at a point a considerable distance therefrom.

The provision of the inlet ports 15 on opposite faces 11 and 12 of the projection 10 presents advantages in that the fluid leaving such ports will exert equal pressures on the oppositely disposed legs 17 so that the frictional resistance between such legs and the faces containing the inlet ports is reduced to a minimum, thereby rendering more delicate the control of the valve by the thermostatic element 27.

The formation of the mixing chamber by means of the separable upper and lower elements 1 and 2 with all of the operating mechanism of the mixing valve secured to the latter member, permits disassembly of the device for inspection and adjustment without a disturbance of any of the operating parts of the mixing valve. The indicating arm 42 may be arranged so as to frictionally engage the index disc 41 so that any displacement of the adjusting means from that to which it has been set due to the action of the fluid in the interior of the mixing chamber, is entirely obviated.

By having the distance between the opposite faces 11 and 12 of the projection 10 less than the effective width of the valve 16, any tendency of such valve to bind or retard the efficient action of the thermostatic element 27 is reduced to a minimum. The projection 10 may have laterally projecting pins 43 secured thereto for the purpose of restraining or limiting excessive movement of the valve 16 which might otherwise occur during the initial setting of the regulator. By providing the limit pins 43, the knob 40 may be turned to the desired temperature as indicated by the indicating arm 42 and the disc 41, whereupon the valve 16 will be moved to uncover the suitable inlet port for the admission of either hot or cold fluid to the mixing chamber until such fluid has affected the temperature of the thermostatic element 27, which

146

element under the influence of such temperature will then correct the position of the valve 16 to admit the proper proportions of hot and cold fluid through the inlet ports 15 from the inlet conduits 5 and 6. A further description of the principles comprising my invention is believed unnecessary for those familiar with the art, suffice it to say that numerous changes may be made in the preferred form thereof here illustrated and described for purposes of convenience without departing from the principles of my invention.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits provided with flat walls in a common plane extending into said chamber, inlet ports in said walls, a valve engaging said walls adapted upon movement thereover to simultaneously vary the fluid flow from each conduit through said ports, and a thermostatic element in said chamber for effecting such movement of said valve.

2. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits provided with oppositely arranged flat walls in common planes extending into said chamber, inlet ports in the opposite walls of each of said conduits, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a thermostatic element in said chamber for effecting such movement of said valve.

3. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces in common planes, inlet ports in said walls of each of said conduits, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a thermostatic element in said chamber for effecting such movement of said valve.

4. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces in common planes, inlet ports in the form of slots in said walls of each of said conduits, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a thermostatic element in said chamber for effecting such movement of said valve.

5. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces in common planes, inlet ports in said walls of each of said conduits, a valve having parallel oppositely disposed faces, the valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a thermostatic element in said chamber for effecting such movement of said valve.

6. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits provided with flat walls in a common plane extending into said chamber, inlet ports in said walls, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a regulatable thermostatic element in said chamber for effecting such movement of said valve.

7. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits provided with oppositely arranged flat walls in common planes extending into said chamber, inlet ports in the opposite walls of each of said conduits, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a regulatable thermostatic element in said chamber for effecting such movement of said valve.

8. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces in common planes, inlet ports in said walls of each of said conduits, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a regulatable thermostatic element in said chamber for effecting such movement of said valve.

9. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces in common planes, inlet ports in the form of slots in said walls of each of said conduits, a valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a regulatable thermostatic element in said chamber for effecting such movement of said valve.

10. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces in common planes, inlet ports in said

walls of each of said conduits, a valve having parallel oppositely disposed faces, the valve engaging said walls adapted upon movement thereover to vary the fluid flow from each conduit through said ports, and a regulatable thermostatic element in said chamber for effecting such movement of said valve.

11. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits provided with flat walls extending into said chamber, inlet ports in said walls, a valve engaging said walls adapted upon relative movement therewith to simultaneously vary the fluid flow through each of said ports, and a U-shaped regulatable thermostatic element in said chamber for effecting such movement of said valve.

12. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces, inlet ports in said walls of each of said conduits, a valve engaging said walls adapted upon relative movement therewith to simultaneously vary the fluid flow through each of said ports, and a U-shaped regulatable thermostatic element in said chamber for effecting such movement of said valve.

13. In a thermostatically operated mixing valve, the combination of a mixing chamber, contiguous hot and cold fluid conduits each provided with walls having parallel flat faces, inlet ports in the form of slots in said walls of each of said conduits, a valve engaging said walls adapted upon relative movement therewith to simultaneously vary the fluid flow through each of said ports, and a U-shaped regulatable thermostatic element in said chamber for effecting such movement of said valve.

14. In a thermostatically operated mixing valve, the combination of a mixing chamber formed of separable sections; one of said sections provided with a discharge port; and the other of said sections provided with hot and cold fluid inlet ports in a common wall, a valve for said ports engaging said wall in a slidable relation, and a thermostatic element for effecting movement of said valve inversely varying the flow of fluid through each of said ports.

15. In a thermostatically operated mixing valve, the combination of a mixing chamber formed of separable sections; one of said sections provided with a discharge port; and the other of said sections provided with hot and cold fluid inlet ports in a common flat wall, a valve for said ports engaging said wall in a slidable relation, and a U-shaped regulatable thermostatic element extending into said first named section for effecting movement of said valve simultaneously varying the flow of fluid through each of said inlet ports.

16. In a thermostatically operated mixing valve, the combination of a mixing chamber, hot and cold fluid conduits extending into such chamber each provided with walls having oppositely disposed flat faces, inlet ports in said walls, a valve engaging said walls adapted upon relative movement therewith to vary the fluid flow through each of said ports, means extending centrally of said chamber movably supporting said valve, and a U-shaped thermostatic element positioned centrally of said chamber adapted to effect such movement of said valve.

17. In a thermostatically operated mixing valve, the combination of a mixing chamber, hot and cold fluid conduits extending into such chamber each provided with walls having oppositely disposed flat faces, inlet ports in said walls, a valve engaging said walls adapted upon relative movement therewith to vary the fluid flow through each of said ports, means extending centrally of said chamber movably supporting said valve, and a U-shaped thermostatic element positioned centrally of said chamber having one terminal secured to said valve and the other terminal thereof secured to movable means for regulating the temperature of the fluid discharged from said chamber.

18. In a thermostatically operated mixing valve, the combination of a mixing chamber, hot and cold fluid conduits extending into such chamber each provided with walls having oppositely disposed flat faces, inlet ports in said walls, a valve engaging said walls adapted upon relative movement therewith to vary the fluid flow through each of said ports, means extending centrally of said chamber movably supporting said valve, and a U-shaped thermostatic element positioned centrally of said chamber having one terminal secured to said valve, movable means extending through the wall of said chamber, and the other terminal of said thermostatic element secured to means associated with said movable means.

19. In a thermostatically operated mixing valve, the combination of a mixing chamber, hot and cold fluid conduits extending into such chamber each provided with walls having oppositely disposed flat faces, inlet ports in said walls, a valve engaging said walls adapted upon relative movement therewith to vary the fluid flow through each of said ports, means extending centrally of said chamber movably supporting said valve, a U-shaped thermostatic element positioned centrally of said chamber, one terminal of said element secured to said valve, a rotatable shaft extending through the wall of said chamber, a rack and pinion associated with said shaft, and the other terminal of said thermostatic element secured to said rack.

20. In a thermostatically operated mixing valve, the combination of a mixing chamber,

hot and cold fluid conduits terminating in ports in a flat wall extending into said chamber, a valve slidably engaging said wall adapted upon movement thereover to cover one of said ports as it uncovers the other, and a thermostatic element in said chamber for effecting such movement of said valve.

21. In a thermostatically operated mixing valve, the combination of a mixing chamber, hot and cold fluid conduits terminating in ports in opposite parallel sides of a block extending into said chamber, a valve member, having two oppositely disposed faces, one closely engaging each of said sides, pivotally suspended at a point above said block, and adapted upon movement to cover one of said ports as it uncovers the other, and a thermostatic element in said chamber for effecting such movement of said valve.

Signed by me this 22d day of May, 1930.

RICHARD F. HENNEUSE.

Nov. 13, 1934. J. J. KENNEY 1,980,624

THERMOSTATIC VALVE

Filed Dec. 8, 1930

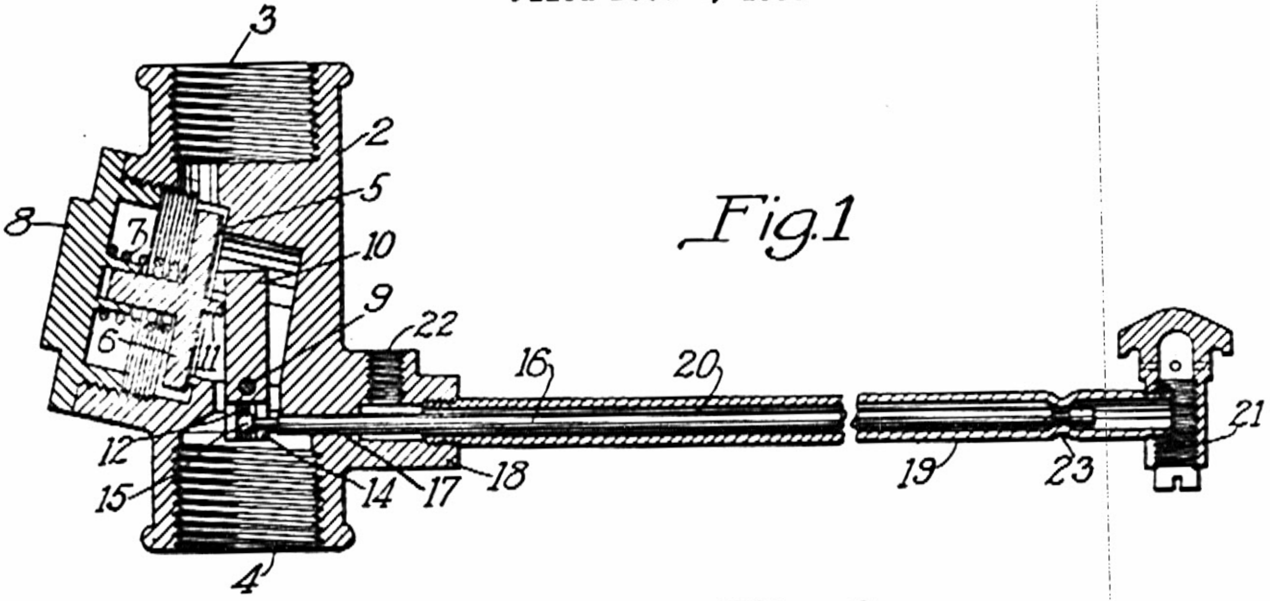


Fig. 1

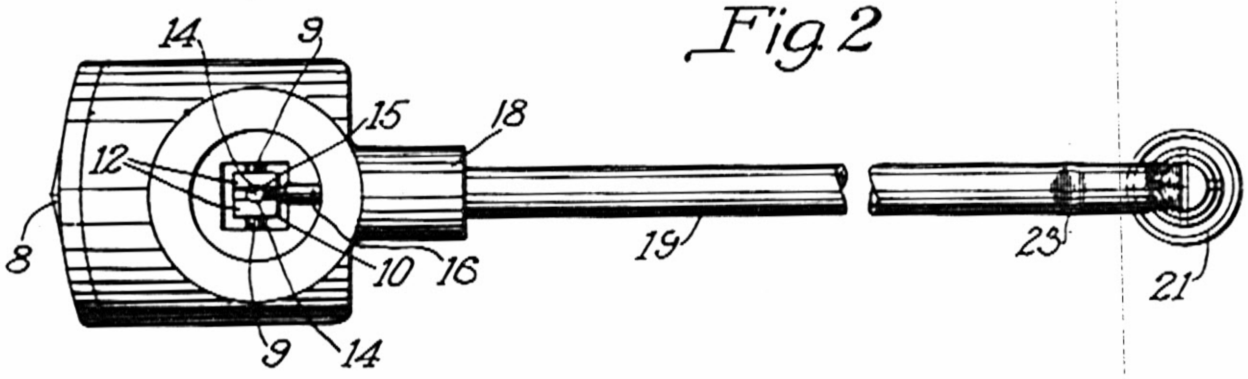


Fig. 2

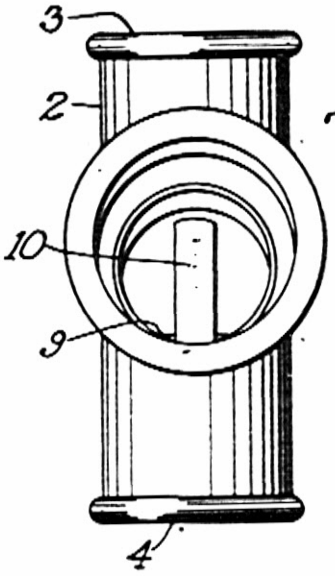


Fig. 3

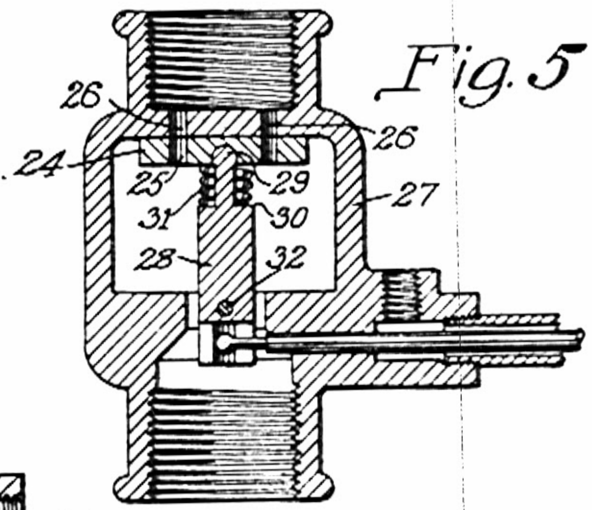


Fig. 5

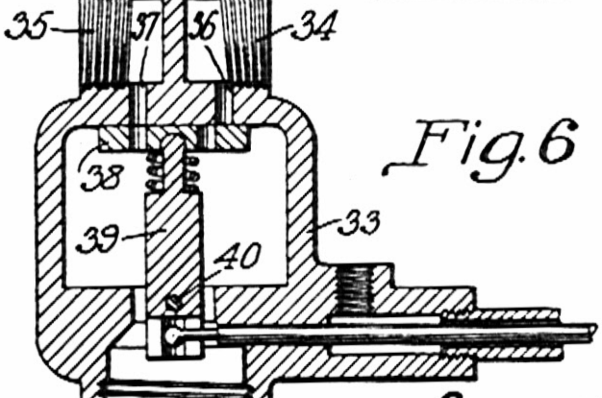
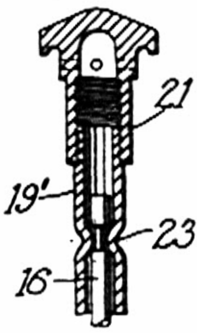


Fig. 6

Fig. 4



INVENTOR
John J Kenney
by
Byrnes, Stebbins, Parmelee
& Blenko
his attorneys

Patented Nov. 13, 1934 **1,980,624**

UNITED STATES PATENT OFFICE

1,980,624

THERMOSTATIC VALVE

John J. Kenney, Pittsburgh, Pa.

Application December 8, 1930, Serial No. 500,756

4 Claims. (Cl. 158—117.1)

The present invention relates broadly to the art of fluid distribution, and more particularly to a valve of the heat responsive type especially adaptable to the handling and control of combustible fluids, such as gas, although the utility of the invention is not limited with respect to the particular fluid being controlled.

In the distribution of gas, for example, it is frequently desirable to provide a suitable form of control mechanism such that when a predetermined flame condition is not maintained, the main supply of fluid will be cut off. As a specific illustration, it is desirable in many cases to make such provision in order to ensure that the main supply of gas cannot be delivered to the burners themselves in case the pilot is extinguished.

In the accompanying drawing I have illustrated my invention as applied to a control mechanism of this type, although it will be understood that the features herein disclosed may be utilized with thermostats of a wide variety of different types and adapted for use under different operating conditions.

The invention has for one of its objects the provision of an improved mechanism by means of which an operative connection is provided between the heat responsive means and the movable means controlled thereby regardless of the particular construction of either of such means.

In the accompanying drawing I have shown for purposes of illustration only, certain preferred embodiments of my invention. In the drawing:

Figure 1 is a longitudinal sectional view through a valve constructed in accordance with my invention;

Figure 2 is a bottom plan view of the valve illustrated in Figure 1;

Figure 3 is a front elevational view of the valve with certain of the parts omitted therefrom;

Figure 4 is a partial view similar to Figure 1 showing the parts in slightly different position;

Figure 5 is a view similar to Figure 1 illustrating another embodiment of the invention; and

Figure 6 is a view similar to Figure 5 illustrating a mixing type valve.

In accordance with the present invention there may be provided a valve body or casing 2 having an inlet connection 3 and an outlet connection 4. Intermediate the inlet and outlet connections there is provided a seat 5 with which cooperates a valve 6. The valve is shown as being of the disk type normally urged in one direction by a spring 7 operative at one end directly against the valve and at its opposite end against the underside of a closure 8. In the embodiment of the invention illustrated, the spring is effective for urging the valve toward its seat for cutting off communication between the inlet and outlet connections.

Extending transversely through the casing 2 is a pivot 9 forming a mounting for a valve operating lever 10. With the parts assembled, one end of the lever 10 directly underlies a projection 11 on the valve, the relationship being such that if the lever is swung in a counter-clockwise direction as viewed in Figure 1 of the drawing, the valve will be moved away from its seat in opposition to the action of the spring 7.

The opposite end of the valve operating lever is shown as comprising bifurcations 12 each having a cylindrical seat 14 therein. Cooperating with the seats is a substantially spherical head 15 carried by a relatively non-expansible rod 16. This construction constitutes in effect a ball and cylindrical socket connection between the rod 16 and the lower end of the lever whereby the lever may be freely moved in either direction in accordance with corresponding movements of the rod. For guiding the rod during its reciprocal movements, the casing 2 is provided with a suitable guide opening 17.

Screwed into a projection 18 on the valve casing in substantially concentric relationship to the relatively non-expansible rod 16 is a tube 19 having a relatively high coefficient of expansion. Such a tube may be conveniently constructed of copper, as is well understood in the art.

The relative dimensions of the tube and rod are such as to provide a substantial space 20 therebetween, through which space gas may be conveyed from the interior of the projection to a burner tip 21 carried by the tube. For supplying gas to the projection I have herein illustrated the same as provided with a threaded opening 22 in which a suitable gas delivery pipe may be secured.

For operatively connecting the relatively expansible and non-expansible members, I have illustrated the rod as provided with a groove 23 into which a portion of the tubing may be compressed whereby contraction and expansion of the tube will be effective for moving the rod and therefore the valve operating lever 10.

With the construction illustrated, it may be assumed that the gas issuing from the burner tip 21 is ignited so that a portion of the heat is transmitted to the tube 19. This heat will be effective for expanding the tube and thereby, through its connection with the rod 16, of moving the rod to the right as viewed in Figure 1, and thereby lifting the valve from its seat. This condition will continue so long as the flame continues to burn. Upon extinguishing the flame, however, the tube 19 will cool and contract, and therefore move the valve operating lever 10 in the opposite direction to permit the valve to close against its seat and cut off communication between the inlet and outlet connections.

By the provision of a substantially universal connection between the rod and the valve operating lever, any tendency toward binding is effectively prevented, and the desired operative movements of the heat responsive mechanism transmitted to the parts controlled thereby. It will be noted that the cylindrical socket has a similar function as a pin and slot connection, thus allowing the head to have rectilinear motion while the depending portion of the lever has arcuate motion.

The form of the invention just described is suitable particularly for installations in which the thermostatic valve is located at one side of the unit being controlled. In many cases it is desirable to position it directly below such unit, and in such case the burner tip 21′ will be applied to the tube 19′ in the manner illustrated more particularly in Figure 4 of the drawing. Otherwise the features and constructional characteristics will be the same as those illustrated in Figure 1.

In Figure 5 there is illustrated a slightly modified form of the invention in which the disk valve 6 of Figure 1 is replaced by a slide valve 24 having openings 25 adapted to cooperate with inlet openings 26 in a casing 27. The upper end of the valve lever 28 is extended and provided with a head having a substantially spherical end portion 29 fitting a corresponding seat in the underside of the slide valve. The lever is also provided with a shoulder 30 against which bears one end of a spring 31, the opposite end underlying the slide valve and maintaining it against its seat. In this construction, as the lever 28 rocks in one direction or the other about its pivotal mounting 32, the openings 25 and 26 will be brought more nearly into, or moved out of registration, thereby controlling the flow through the valve.

In Figure 6 there is shown a casing 33 having an inlet 34 for one fluid and an inlet 35 for a second fluid, these inlets communicating respectively with ports 36 and 37. Cooperating with these ports is a slide valve 38 similar to the valve 24 and operated in the same manner. With this construction, as the valve lever 39 moves to the right as viewed in Figure 6, the quantity of fluid supplied to the port 36 will increase gradually while the quantity of fluid supplied through the port 37 will decrease. Upon movement in the opposite direction the reverse condition will take place, thus enabling the valve to serve as a mixing device or control device for a plurality of different fluids.

Further advantages arise from ease of assembly of the parts, since the tube 19 may be screwed into the projection 18, thus bringing the head 15 beneath the valve chamber. The lever 10 may be inserted through the valve chamber (the closure 8 and valve 6 being at this time removed) so as to make connection with the rod 16, the spherical head 15 sliding upwardly in the cylindrical socket. With the lever 10 in position, the pivot pin 9 can be readily slipped through the valve casing and through the lever 10. With the parts assembled, disengagement thereof is prevented.

While I have herein illustrated the connecting means as embodied in a so-called pilot control valve, it will be apparent that operating means of this character may be utilized in valves of a wide variety of different types, and that other changes in the construction and operation herein described may be made without departing either from the spirit of my invention or the scope of my broader claims.

I claim:

1. As an article of manufacture, a valve casing, a valve therein, a valve operating lever operably connected to said valve, and heat responsive mechanism including an element movable lengthwise for rocking said lever and a guide for an end of said element, said end of said element being coupled to said lever by a ball and cylindrical socket connection.

2. As an article of manufacture, a valve casing, a valve therein, a valve operating lever operably connected to said valve, and actuating means for said lever including a rod reciprocable longitudinally of its axis and a guide for an end of said rod, said end of said rod being coupled to said lever by a ball and cylindrical socket connection.

3. A thermostatic valve comprising a valve casing, a valve therein, a valve operating lever operably connected to said valve, actuating means for rocking said lever including an element movable lengthwise, and a guide for one end of said element, said end being coupled to said lever by a ball and cylindrical socket connection.

4. As an article of manufacture, a valve casing, a valve therein, heat responsive means for operating said valve including a rod movable lengthwise of its axis, a guide for an end of said rod, and means having a ball and cylindrical socket connection with said end of said rod for operably connecting said rod to said valve.

JOHN J. KENNEY.

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May 1, 1934. F. C. LEONARD 1,957,276

THERMOSTATIC MIXING REGULATOR

Filed Sept. 21, 1932 2 Sheets-Sheet 1

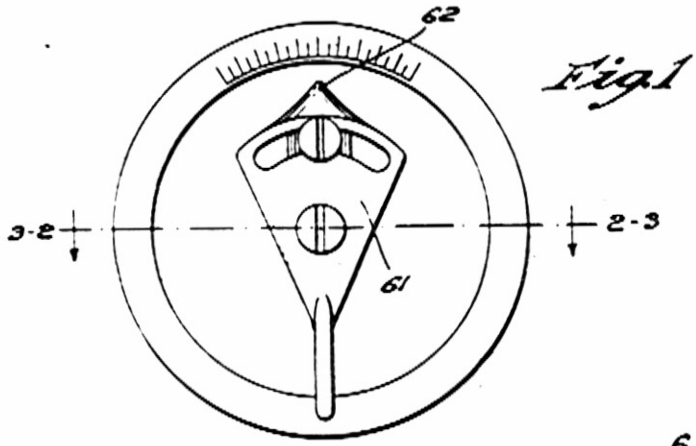


Fig.1

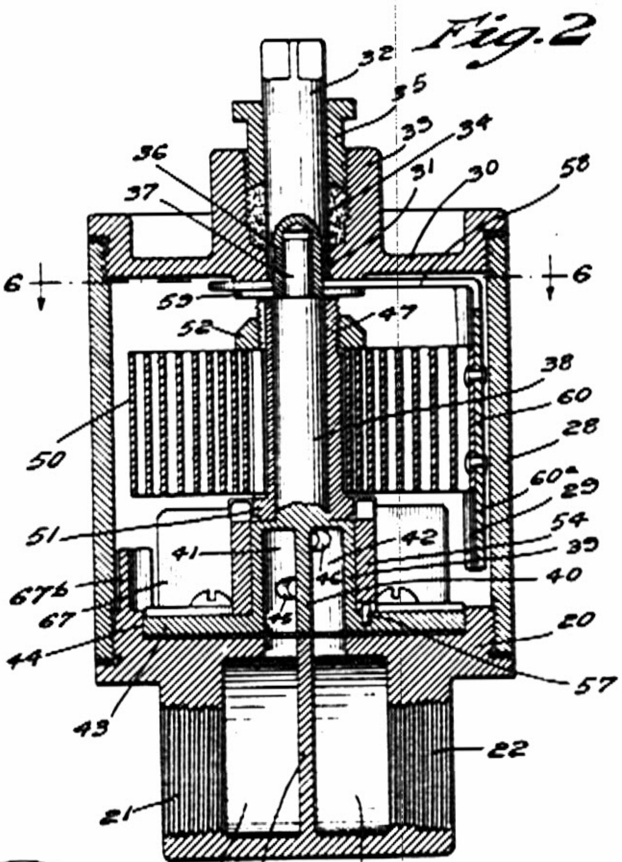


Fig.2

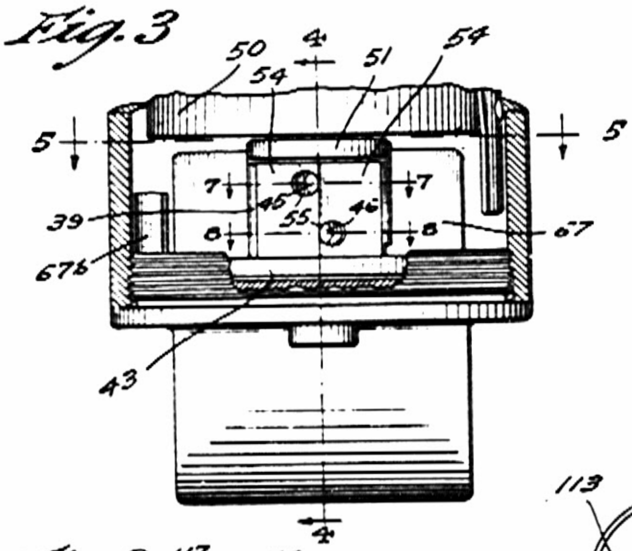


Fig.3

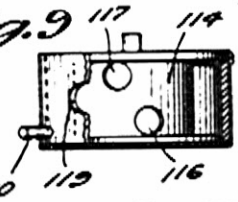


Fig.9

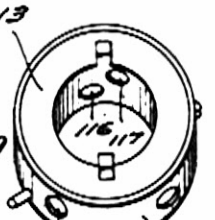


Fig.10

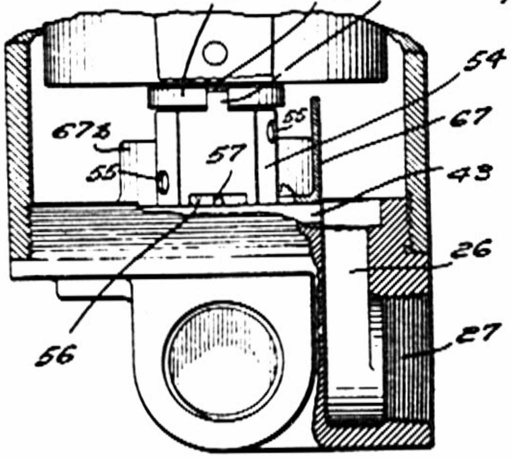


Fig.4

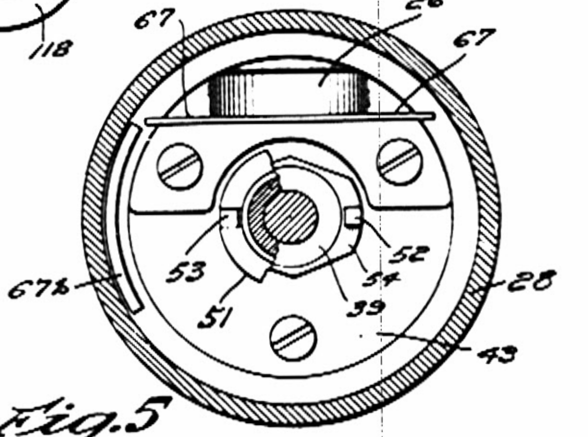


Fig.5

Inventor
Frederick C. Leonard

By Nathaniel Frucht
his Attorney

110

May 1, 1934. F. C. LEONARD **1,957,276**

THERMOSTATIC MIXING REGULATOR

Filed Sept. 21, 1932 2 Sheets-Sheet 2

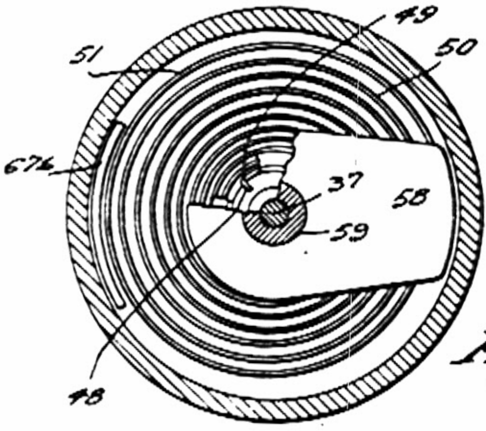


Fig. 6

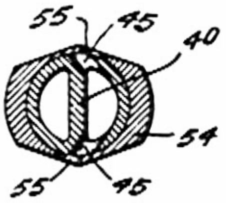


Fig. 7

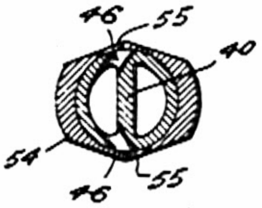


Fig. 8

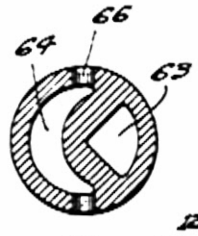


Fig. 12

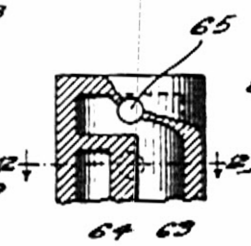


Fig. 11

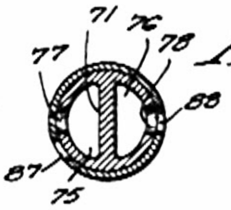


Fig. 14

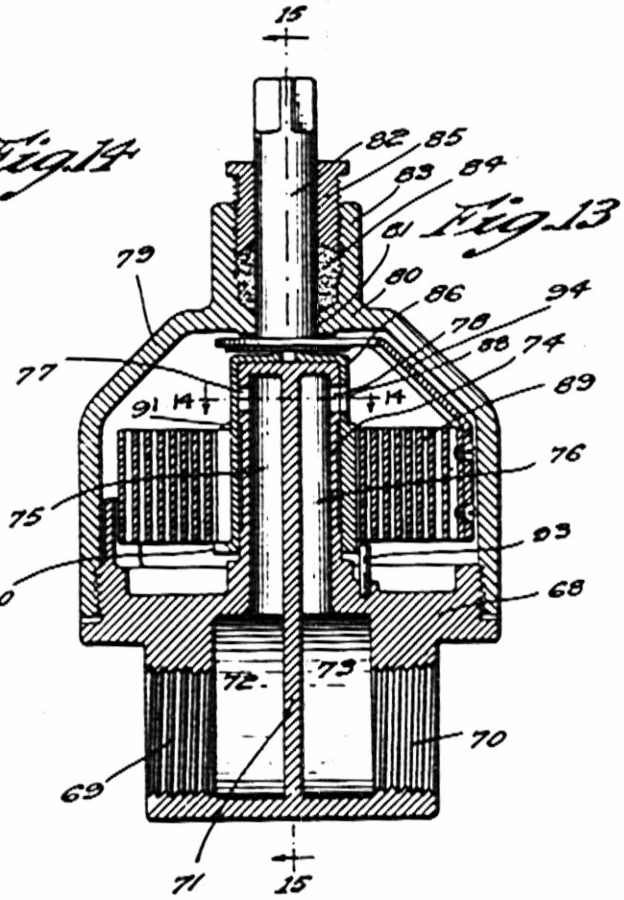


Fig. 13

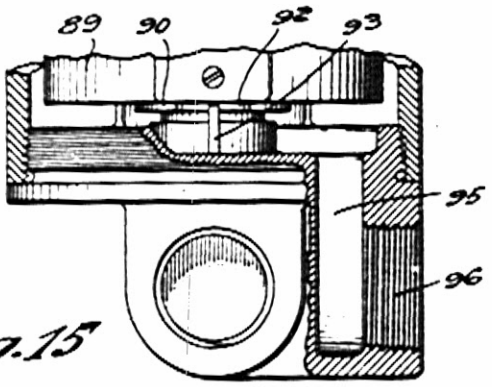


Fig. 15

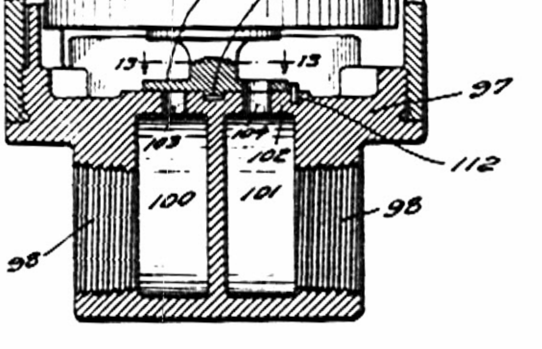


Fig. 16

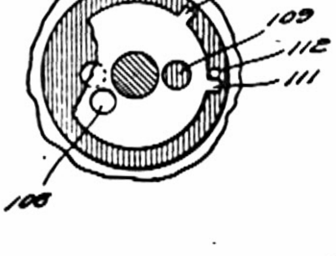


Fig. 17

Inventor
Frederick C. Leonard
By Nathaniel Frucht
his Attorney

Patented May 1, 1934 1,957,276

UNITED STATES PATENT OFFICE

1,957,276

THERMOSTATIC MIXING REGULATOR

Frederick C. Leonard, Providence, R. I.

Application September 21, 1932, Serial No. 634,181

12 Claims. (Cl. 236—12)

My present invention relates to thermostatic regulators and has particular reference to regulators for mixing fluids of different temperatures to obtain a fluid of predetermined temperature.

The regulators designed for mixing fluids of definite temperatures have heretofore utilized valves for varying the inlet flow area, thus controlling the relative proportions of the different fluids, and have shifted the valves by means of thermostats which are subjected to the temperature of the mixed fluids and which are operatively connected to the valves, as by means of levers, fingers, or the like.

Such constructions require operating space, thus increasing the size of the regulator to take care of a given flow, and increasing the cost of manufacture and of assembly. It is the principal object of my invention to simplify the regulator construction by connecting the thermostatic element directly to the valve mechanism so as to produce direct movement of the valve mechanism upon movement of the thermostatic element in response to temperature changes of the mixed fluid.

To this end, I have devised a novel rotatable valve construction which is directly operated by or is attached to the thermostatic element, thus eliminating intermediate operating mechanism and its attendant friction and lost motion; and I have found that the novel construction permits a substantial reduction in the size of the regulator and thus reduces the cost of manufacture and of assembly, with further advantage in that the reduced size also increases the relative sturdiness and ruggedness of the regulator.

With the above and other objects and advantageous features in view, the invention consists of an improved method of control and a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more particularly defined in the claims appended hereto.

In the drawings,

Fig. 1 is a top plan view of the novel regulator;

Fig. 2 is a vertical section thereof on the line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1, parts being broken away, the valve mechanism being shown in elevation;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a section on the line 5—5 of Fig. 3;

Fig. 6 is a section on the line 6—6 of Fig. 2, parts being broken away;

Fig. 7 and Fig. 8 are sections on the line 7—7 and 8—8 of Fig. 3;

Fig. 9 is a vertical view, partly broken away, of a modified form of valve construction;

Fig. 10 is a perspective view of the same;

Fig. 11 is a vertical view of a modified form of valve chamber construction;

Fig. 12 is a section on the line 10—10 of Fig. 9;

Fig. 13 is a vertical section of a modified form of regulator;

Fig. 14 is a section on the line 14—14 of Fig. 13;

Fig. 15 is a fragmentary section on the line 15—15 of Fig. 13;

Fig. 16 is a view similar to Fig. 13 showing a modified form of valve mechanism therefor; and

Fig. 17 is a section on the line 17—17 of Fig. 16.

Referring to the drawings, particularly Fig. 2, the valve mechanism includes a base 20 which is provided with threaded inlets 21 and 22 for fluids of different temperatures, the inlets being separated by a partition 23 to provide inlet chambers 24, 25; the base 20 also has an outlet chamber 26, see Fig. 4, which communicates with a threaded outlet 27.

The upper end of the base 20 is recessed as shown in Figs. 2 and 3, and is threaded, to receive a similarly threaded casing 28, the interior of which provides a mixing chamber 29 positioned above the base 20. The upper end of the casing 29 is closed by means of a cap 30, which as shown is flanged to fit over the top of the casing 28 and to screw-threadedly engage therewith. Suitable packings of standard type are provided between the base, the cap, and the casing. The cap has a central bore 31 to accommodate a control shaft 32, a vertical flange 33 concentric with and spaced from the operating shaft extending upwardly to provide a packing recess 34 in which packing of usual type is inserted, the packing being locked in place by a flange nut 35 which is threadedly mounted in the flange 33. The lower end of the control shaft is bored or recessed as at 36 to provide a bearing for the reduced end 37 of a vertical shaft 38, this shaft having a cylindrical base 39 depending therefrom and preferably integral therewith, this base being separated by a vertical partition 40 into two valve chambers 41, 42, and having a terminal plate section 43 which sits in a circular recess 44 of the base 20, suitable packing being provided between the plate section and the base.

As best shown in Fig. 2, the two chambers 41, 42 communicate directly with the inflow chambers

24, 25, the two latter chambers being respectively provided with pairs of outflow ports 45, 46 which are spaced as shown on opposite sides of the base 39 to balance the pressures of the outflowing fluids therefrom.

A tubular element 47 is mounted on the shaft 38, this element having an external slot 48 extending vertically therein as indicated in Fig. 6, to receive the bent inner end 49 of a thermostat coil 50, the inner convolutions of the thermostat coil resting on the extended base 51 of the tubular element, and the upper end of the tubular element being threaded to receive a lock nut 52 for firmly locking the thermostatic element in place. The extended base 51 has spaced slots 52, which receive keys or fingers 53 of a cylindrical valve 54, this valve being provided with ports 55 which are adapted to register with the port openings 45, 46 as indicated in Fig. 3, whereby rotary movement of the valve increases the flow area of the ports which communicate with the chamber 41 and simultaneously decreases the flow area of the port openings which communicate with the chamber 42, and vice versa. As indicated in Figs. 2 and 4, the valve 54 has a slot 56 at the lower end thereof which is adapted to engage with a limit pin 57 seated in the plate section 43 for limiting rotative movement of the valve.

Referring now to Figs. 1 and 2, the control shaft 32 has a plate 58 secured at the lower end thereof, as by a flange 59, the plate 58 being bent to provide a depending bracket portion 60 which is secured to the outer convolution of the thermostat coil, as by rivets or the like, and extends therebelow to provide a depending stop contact 60*a* which engages with an upstanding flange section 60*b* on the base. A handle 61 is mounted on the upper end of the control shaft for rotating the same, and an indicator 62 is formed on the handle for movement in unison with the handle and the control shaft, the end of the indicator cooperating with indicators or characters engraved or otherwise indicated on the rim of the cap, as indicated in Fig. 1.

As shown in Figs. 7 and 8 the port openings 45, 46 are preferably slanted or inclined so as to bring the ports 45, 46 in vertical alignment. Instead of using slanting port openings, an alternative construction such as shown in Figs. 11 and 12 may be utilized, in which the two chambers 63, 64 are shaped as indicated whereby ports 65, 66 may be obtained by radial drilling, these ports being in vertical alignment, and thus balancing the pressures of the outflowing fluid.

The operation of the improved regulator may now be explained. Referring to Fig. 2 the inflowing fluids of different temperatures enter through inlets 21, 22 into the inlet chambers 24, 25 and thence pass upwardly into the outflow chambers 41, 42 and through the port openings 45, 46 and ports 55 into the mixing chamber 29 to contact the thermostat coil and then flow through the outlet chamber 26 to the outlet 27. To prevent direct flow into the outlet chamber, a shield 67, see Fig. 4, is positioned so as to force the inflowing streams of fluid to traverse the convolutions of the thermostat coil before entering the outlet chamber 26. The temperature of the outgoing fluid is controlled by rotating the handle 61, this rotation turning the thermostat coil so as to obtain a proper setting of the valve 54 to suitably proportion and control the flow of the hot and cold fluids through the ports 45 and 46. Any variation in the temperature of the mixed fluid causes a movement of the thermostat coil and thus directly rotates the valve 54 due to the connection of the tubular element 47 therewith, this tubular element of course moving as the inner end of the coil turns.

The above described constructions have been found very efficient for the desired temperature control, and have reduced the total volume of the regulator greatly in comparison with previous regulators, for the same flow capacity. For certain purposes, however, a still more compact regulator has been found desirable, and the constructions shown in Figs. 13 to 17 have been devised to obtain still greater compactness of the operating mechanism.

Referring to Fig. 13, the base 68 is similar in general construction to the base 20, being provided with threaded inlets 69, 70 and a central partition 71 which separates the adjacent portion of the base into two inflow chambers 72, 73. The upper portion of the base 68 is extended to provide a cylindrical section 74 which is separated by the upper portion of the partition 71 into two fluid chambers 75, 76; ports 77, 78 are provided at the upper ends of the chambers 75, 76 to permit outflow of the two fluids.

A cap 79 is threadedly mounted on the upper portion of the base 68, as shown in Fig. 11, and converges inwardly at the upper end thereof to provide a top section 80 with a central bore 81 in which a control shaft 82 is mounted, the top section having an upwardly extending flange 83 which is concentric with and spaced from the control shaft 82 to provide a packing recess 84 for receiving packing, a flange nut 85 of standard construction threadedly engaging the interior of the flange 83 to lock the packing in place.

A tubular hub 86 is mounted over the cylindrical section 74 and is provided with port openings 87, 88 which are adapted to register with the outflow openings 77, 78 as indicated in Fig. 12; a thermostat coil 89 is secured to the hub 86 at its inner end, and is locked in place in any desired manner, the preferred construction including a laterally extending lower flange 90 and an upper lock flange or the like 91. The lower flange 90 has a slot 92 therein, which cooperates with a limit pin 93 secured in the upper portion of the base 68.

The control shaft 82 has a plate bracket 94 secured to the lower end thereof, this plate being locked to the outer convolution of the thermostat coil by rivets or the like, and having a depending stop cooperating with an upwardly positioned stop flange segment on the base. The base 68 has a recess or outflow chamber 95 through which the mixed fluid passes on its way to the outlet opening 96.

The operation of this modified form of valve construction is similar to the operation of the first embodiment described, the entering fluids passing into the chambers 72, 73 and out through the port openings 77, 78, the extent of the outflow being governed by the position of the valve ports 87 and 88 as the valve moves in accordance with movement of the thermostat coil upon change of temperature of the mixed fluid. The two fluids thus emerge above the thermostat coil, thoroughly mix, and pass through the coil convolutions into the outflow chamber 95. If desired, the interior construction of the cylindrical section 74 may be similar to the construction shown in Figs. 7 and 8, or 11 and 12, and the number of outflow ports and valve openings may be increased to obtain the same outflow effect as in the first described embodiment.

Instead of using a tubular type valve such as shown in the previously described embodiments, a plate type valve such as indicated in Figs. 16 and 17 may be utilized. Referring to Fig. 16 the base 97 is provided with inlets 98, 99 and inflow chambers 100 and 101 of the type disclosed in the other embodiments, and the general construction of the mixing chamber and control mechanism is similar; the upper portion of the base 97 may, however, be formed as a flat portion 102 provided with port openings 103, 104, and with a central recess 105 to receive a depending hub 106 of a plate valve 107 which is secured to the inner end of the thermostat coil in any desired manner, the preferred construction comprising a cylindrical hub or the like secured to the plate valve and extending within the thermostat coil to be riveted to the inner convolution thereof. The plate valve 107 is provided with spaced ports 108, 109 adapted to cooperate with the inflow ports 103, 104, and has spaced teeth or projections 110, 111 on the periphery thereof which cooperate with a limit pin 112 mounted in the base 97 so as to limit the rotatable movement of the plate valve.

The above described constructions utilize and permit direct flow of the hot and cold fluids from the inlet chambers to the mixing chamber. It has been found desirable, however, to provide a construction which permits a preliminary mixing, the valve construction illustrated in Figs. 9 and 10 being an example thereof.

The valve 113 comprises an inner element 114 of generally spool shape, the central cylindrical portion 115 having ports 116, 117 on opposite sides thereof to receive the fluids of different temperatures, the fluids entering a circular runway or mixing chamber formed by the cylindrical portion and the flanges of the spool element, and the outer cylindrical shell 118, the shell having outlets 119 communicating with the main mixing chamber containing the thermostatic element. If desired, the stop construction may be utilized comprising a pin 120, which may be secured to the spool element and project through the shell, the pin cooperating with spaced stop teeth or the like on the base. This construction produces a more uniform temperature regulation.

The practical thickness of the thermostatic element as utilized in the above described embodiments produces sufficient movement, for ordinary temperature ranges, to permit a large scale reading and to produce adequate valve movement without complications in view of the novel design of the port controls. If desired, the thermostat may be formed as a plurality of superimposed coils mounted for series movement to increase the operative movement and force; when using multiple coils of this type it is preferred to direct the fluid outflow through an initial annular mixing chamber into the main chamber containing the coils, the outflow being directed between the superimposed coils.

The above described constructions therefore provide a readily manufactured and easily assembled type of thermostatic regulator of small volume with respect to its flow capacity and with a minimum of operating parts, as the thermostatic element operates directly on the valve mechanism to produce the necessary change in flow volume of the two fluids.

While I have described specific constructional embodiments of my invention, such changes in the size, in the proportions, and in the relative arrangement of the parts, may be made as appear desirable for particular mixed fluid regulation installations, without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. In a thermostatic mixing regulator, a base having inlet chambers for inflow of fluid of different temperatures and an outlet chamber for outflow of mixed fluid, a casing over said base forming a mixing chamber, said inlet chambers having port openings for communication with said mixing chamber, inlet flow control means in said mixing chamber including rotatable valve mechanism having ports cooperating with said port openings, and a thermostatic element mounted in said mixing chamber and operatively connected to said valve mechanism.

2. In a thermostatic mixing regulator, a base having inlet chambers for inflow of fluid of different temperatures and an outlet chamber for outflow of mixed fluid, a casing over said base forming a mixing chamber, said inlet chambers having openings for communication with said mixing chamber, inlet flow control means in the lower portion of said mixing chamber including rotatable valve mechanism having ports cooperating with said port openings, and a thermostatic element mounted in the upper portion of said mixing chamber and operatively connected to said valve mechanism.

3. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in said mixing chamber having separate flow passages therein and provided with port openings leading from said separate flow passages to said mixing chamber, movable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted in said mixing chamber and operatively connected to said valve means.

4. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in the lower portion of said mixing chamber having separate flow passages therein and provided with port openings leading from said separate flow passages to said mixing chamber, movable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted in the upper portion of said mixing chamber and operatively connected to said valve means.

5. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in said mixing chamber having separate flow passages therein and provided with port openings leading from said separate flow passages to said mixing chamber, the port openings for the separate flow passages being in alignment, movable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted in said mixing chamber and operatively connected to said valve means.

6. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in the lower portion of said mixing chamber having separate flow passages therein and provided with port openings leading from said separate flow passages to said mixing chamber, the port openings for the separate flow passages being in alignment, movable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted in the upper portion of said mixing

114

chamber and operatively connected to said valve means.

7. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in said mixing chamber having separate flow passages therein and provided with port openings leading from said separate flow passages to said mixing chamber, rotatable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted in said mixing chamber and operatively connected to said valve means.

8. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in said mixing chamber having separate flow passages therein and port openings leading from said separate flow passages to said mixing chamber, a support shaft on said hub element, movable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted on said support shaft and operatively connected to said valve means.

9. In a thermostatic mixing regulator, a mixing chamber, a cylindrical hub element in said mixing chamber having separate flow passages therein and port openings leading from said separate flow passages to said mixing chamber, a support shaft on said hub element, rotatable valve means mounted on said hub and controlling the flow area of said port openings, and a thermostatic element mounted on said support shaft and operatively connected to said valve means.

10. In a thermostatic mixing regulator, a base having centrally positioned inflow chambers, a mixing chamber, partitioned walls separating said inflow chambers from said mixing chamber and having communication port openings therethrough, movable valve means having ports controlling flow through said port openings, and thermostatic means in said mixing chamber operatively connected to said valve means.

11. In a thermostatic mixing regulator, a base having centrally positioned inflow chambers, a mixing chamber, partition walls separating said inflow chambers from said mixing chamber and having communication port openings therethrough, rotatable valve means having ports controlling flow through said port openings, and thermostatic means in said mixing chamber operatively connected to said valve means.

12. In a thermostatic mixing regulator, a base having centrally positioned inflow chambers, a mixing chamber, partition walls separating said inflow chambers from said mixing chambers and having radial communication port openings therethrough, movable valve means having ports controlling flow through said port openings, and thermostatic means in said mixing chamber operatively connected to said valve means.

FREDERICK C. LEONARD.

CERTIFICATE OF CORRECTION.

Patent No. 1,957,276. May 1, 1934.

FREDERICK C. LEONARD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 80, claim 10, for "partitioned" read partition; and line 99, claim 12, for "chambers" read chamber; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of October, A. D. 1934.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.

March 15, 1938. F. C. LEONARD ET AL **2,110,884**

115

THERMOSTATIC DEVICE

Filed May 21, 1932 2 Sheets-Sheet 1

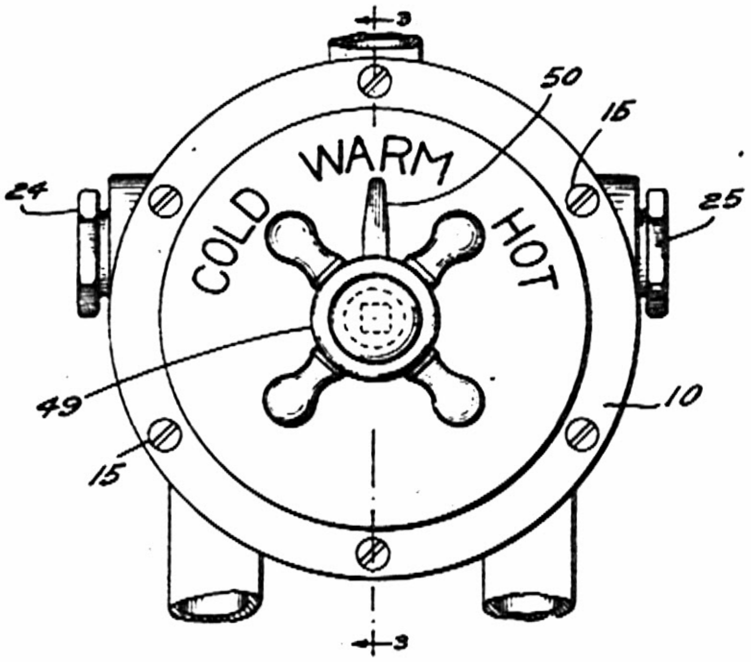


Fig. 1

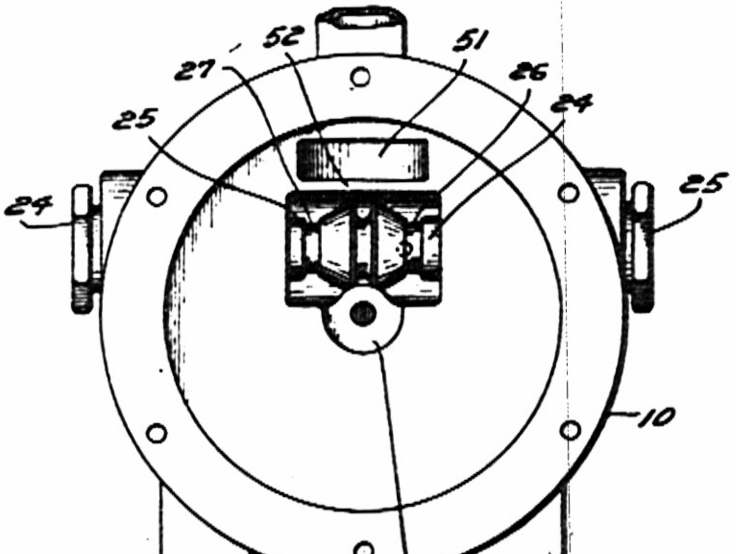


Fig. 2

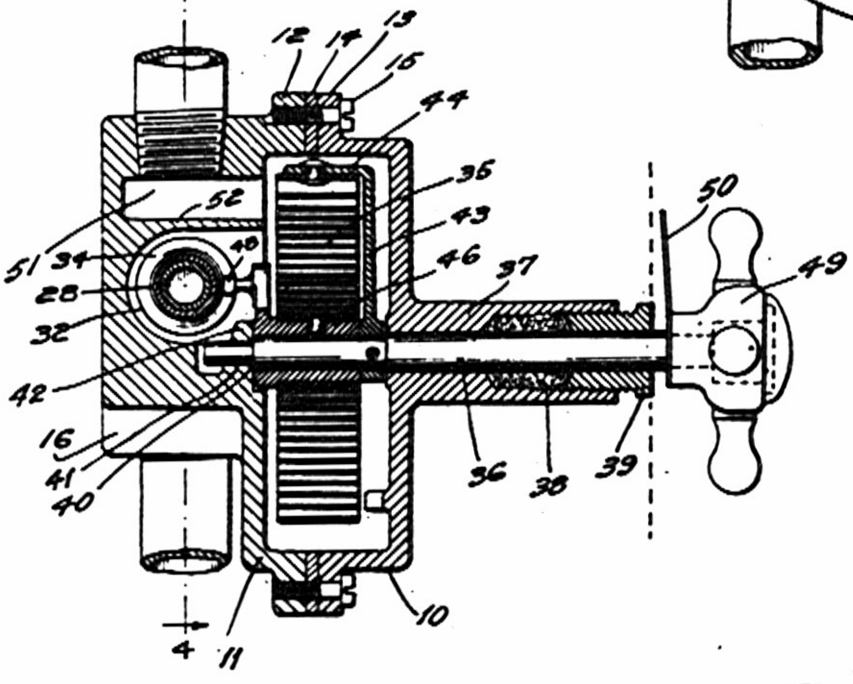


Fig. 3

Inventors
Frederick C. Leonard
Germaine Ross
By Nathaniel Frucht
their Attorney

167

March 15, 1938. F. C. LEONARD ET AL 2,110,884 116

THERMOSTATIC DEVICE

Filed May 21, 1932 2 Sheets-Sheet 2

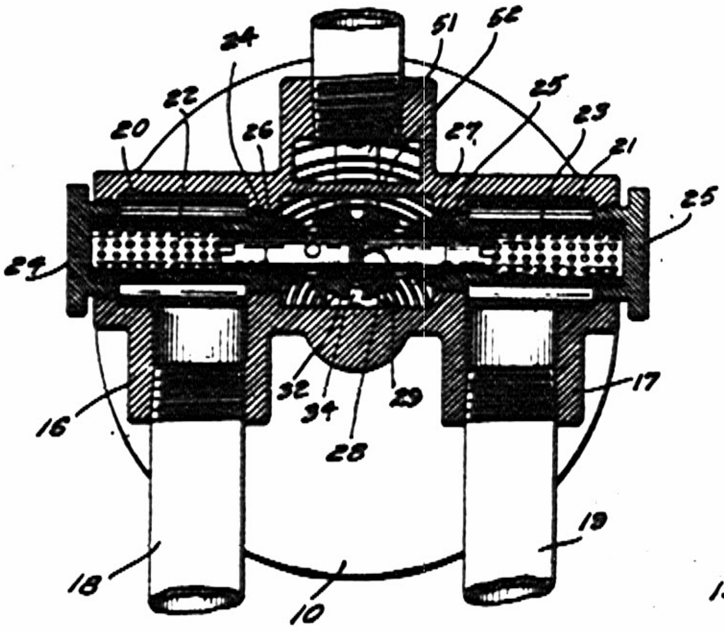


Fig. 4

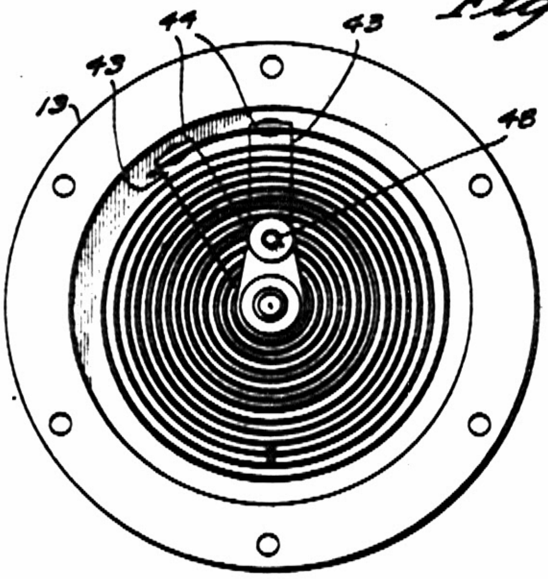


Fig. 5

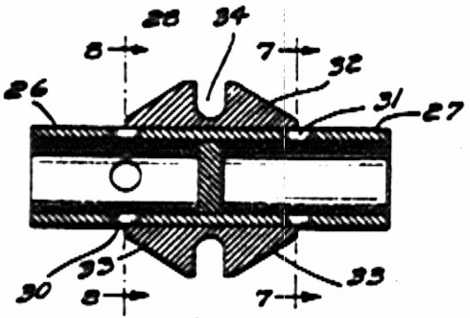
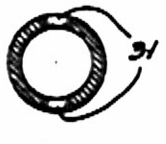


Fig. 6



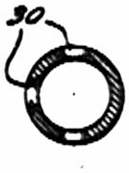


Fig. 7

Fig. 8

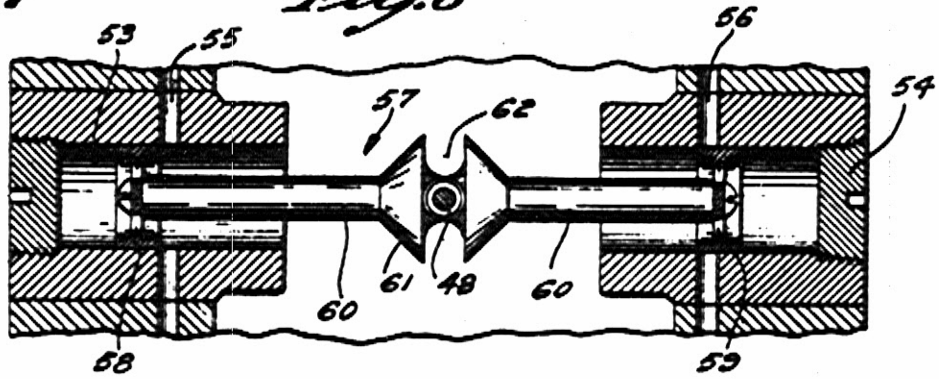


Fig. 9

Inventors
Frederick C. Leonard
Germain Ross
By Nathaniel Frucht
their Attorney

168

Patented Mar. 15, 1938 **2,110,884**

117

UNITED STATES PATENT OFFICE

2,110,884

THERMOSTATIC DEVICE

Frederick C. Leonard, Cranston, and Germain Ross, Providence, R. I.

Application May 21, 1932, Serial No. 612,760

6 Claims. (Cl. 236—12)

Our present invention relates to thermostatic mixing regulators, and has particular reference to regulators for maintaining a desired temperature of flowing water.

The principal object of our invention is to devise a thermostatic regulator of inexpensive construction, adapted to control fluid flows accurately, and capable of maintaining the temperature of the flowing fluid substantially constant.

A further object of our invention is to design the mixing chamber and the flow area so as to ensure adequate mixing of the hot and cold streams prior to contact with the thermostatic element.

An additional object of our invention is to devise valve constructions which are not changed in setting by variations and relative differences in the pressures of the hot and cold fluids.

Another object of our invention is to provide a regulator construction that is extremely rugged, is not easily deranged, and cannot be rendered inoperative short of actual breakage.

With the above and other objects and advantageous features in view the invention consists of a novel regulator construction and a novel inlet flow control therefor, more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more particularly defined in the claims appended thereto.

In the drawings,

Fig. 1 is a top plan view of the novel regulator;

Fig. 2 is a view thereof with the front portion removed, showing the flow control valve;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a bottom view of the front portion, showing the thermostatic coil;

Fig. 6 is an enlarged view of the valve and valve seat;

Fig. 7 is a section of Fig. 6 on the line 7—7;

Fig. 8 is a section of Fig. 6 on the line 8—8; and

Fig. 9 is a sectional view of a modified construction of the valve and valve seat.

Referring to the drawings, the improved regulator comprises a front member **10** in which the thermostatic element, the setting mechanism, and the valve operating mechanism are housed, and a back member **11** in which the valve mechanism is housed, both members being preferably cast of brass. The back and front members have annular machined flanges **12**, **13** between which a packing **14** is positioned, the two members being secured together by screws or the like **15** which pass through suitable openings in the flange **13** and screw threadedly or otherwise engage the flange **12**.

As best shown in Fig. 4, the back member has two inlets, **16**, **17** threaded to receive the correspondingly threaded ends **18**, **19** of inlet conduits for fluids of different temperatures. The incoming fluids enter chambers **20**, **21** in which cylindrical strainers **22**, **23** are mounted, the strainers being secured at their outer ends to caps **24**, **25** which are threaded in suitable openings in the ends of the chambers and are thus adapted to be readily removed for cleaning. The inner ends of the strainers engage the ends of bearing nipples **24**, **25** which are screw threadedly mounted at the other ends of the chambers, and have recesses **26**, **27** which receive the ends of an inlet cylinder **28** which as shown is provided with a partition **29** or the like to keep the entering fluids from mixing. The cold side of the inlet cylinder has three lateral ports **30**, and the hot side has two lateral ports **31**, these ports being controlled by a slide valve **32**, having opposed conical faces **33** and a central groove **34** for receiving the operating arm of the thermostatic control, as hereinafter described. The inlet cylinder is positioned so as to direct the inflowing streams of fluids generally away from the thermostatic coil, thus producing mixing before the fluids reach the thermostatic coil.

Referring to Figs. 2 and 5, now, the front member is cup-shaped to house the thermostatic element **35**, this element being formed as a spiral coil. An operating shaft **36** is rotatably mounted in the central bushing **37** of the front member, which is recessed to receive the usual packing **38** held in place by the flange nut **39** which screw threadedly seats in the central bushing recess. The end of the operating shaft is reduced slightly to form a shoulder **40**, and seats in a bore **41** of a thrust bearing member **42** provided in the back member, whereby the operating shaft and its operating parts cannot be forced down, as for example by a blow on the handle or the end of the shaft, so as to damage the valve mechanism.

A radial plate **43** is pinned or otherwise secured to the shaft **36**, and is bent over at its end to provide a lock plate **44** which is riveted or otherwise secured to the outer end of the thermostatic coil. A thimble **46** is rotatably mounted on the shaft **36** and is secured to the inner end of the thermostatic element, and has an operating arm **47**, preferably integral therewith, with a depending finger **48** which is positioned in the valve groove **34**. The end of the operating shaft is squared to receive a handle **49** and a pointer

169

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or indicator **50**, which may cooperate with a graduated temperature plate mounted as indicated by the dotted line in Fig. 3, or may be bent over to cooperate with indications on the front member such as shown in Fig. 1.

The mixed fluid passes upwardly from the valve chamber, through the thermostatic coil, and out through the outlet chamber **51**, see Fig. 3, which as shown is separated from the valve chamber by a partition **52**.

It has been found that surge is produced where pockets of hot and cold water are alternately formed within the regulator, and that the above described construction prevents surge by directing most of the incoming fluid into the mixing chamber, and permitting a small amount of the hot and the cold fluid to enter the upper chamber. It has also been determined that better regulation is obtained if the inlet opening for the cold water is slightly larger than the inlet opening for the hot water; although the reason for this is not clear, the experimental information obtained has indicated that the combination of three inlet ports for the cold water and two inlet ports for the hot fluid is satisfactory.

The valve mechanism described is balanced, as the fluid inlets direct the flow across the valves. The valve is not therefore affected by variations or relative differences in the pressures of the hot and the cold fluids, as the entering streams are in substantially parallel planes. Observation has disclosed that the hot and cold streams diverge towards the sides, as the flow begins, and then become radial with respect to the inlet cylinder as the flow increases. Preferably, the ports are positioned so that the outflowing fluids do not directly contact the thermostatic element which is mounted in the front member. The conical form of the valve ends has been found to facilitate the mixing of the hot and cold fluids.

Referring to Figs. 3 and 4, the operation of the novel small flow thermostatic regulator may now be explained:

The handle is first manually turned to bring the pointer or indicator opposite the desired temperature indication; at this setting the thermostatic coil assumes a position such that it would be without strain, if the temperature of the mixed fluid corresponded to the temperature indication. The hot and cold water streams entering the inlet cylinder pass radially through the inlet ports, and mix to pass between the thermostatic coils to the outlet chamber. As will be noted from Fig. 3, the available flow space is restricted to a minimum, thus forcing the mixed fluid to pass through the thermostatic coil convolutions and to the outlet chamber, without local eddies or disturbances.

If the temperature of the mixture changes from the set temperature due to change in temperature of the hot or cold fluid, the thermostatic coil expands or contracts to shift the valve and thus vary the relative volume of hot and cold fluid. The radial inlet ports, the conical form of the valve ends, the mixing, and the limited flow space, result in an instant response to temperature changes without surging.

If desired, a balanced valve construction such as shown in Fig. 9 may be used. In this form, the inlet chambers **53**, **54** have lateral ports **55**, **56**, controlled by a slide valve **57** which has two cylindrical valve sections **58**, **59**, the sections being secured by spiders to central rods **60** which end in inner conical portions **61** with a central groove **62** adapted to receive the operating finger of the control mechanism. This construction balances the flow to the mixing chamber, and thus controls the inlet areas independently of fluid pressure differences or variations. If the pressure of the fluids is high, it may be advisable to mount stationary deflectors around the rods **60**, to deflect the water away from the conical portions **61** and thus eliminate side thrust of the inflowing fluids on the valve mechanism.

While we have described specific embodiments of our invention, such changes in the design, in the proportions, and in the arrangement of the parts may be made to suit particular or special requirements for thermostatic regulators, without departing from the spirit or the scope of the invention as defined in the appended claims.

We claim:—

1. In a thermostatic regulator, a mixing chamber, inlets for conducting hot and cold fluid to said mixing chamber, reciprocatable valve mechanism controlling flow from said inlets to said mixing chamber, a rotatable control shaft, a thermostatic element fixed at one end to said control shaft, and having an element at the other end operatively connected to said valve mechanism, and a thrust bearing engaging said control shaft to limit movement of said control shaft and its associated mechanism towards said valve mechanism.

2. In a thermostatic regulator, a mixing chamber, inlets for conducting hot and cold fluid to said mixing chamber, valve mechanism controlling flow from said inlets to said mixing chamber, a rotatable control shaft, a thermostatic element fixed at one end to said control shaft, and having an element rotatably mounted on said control shaft and at the other end operatively engaging said valve mechanism, and a thrust bearing engaging said control shaft to limit movement of said control shaft and its associated mechanism towards said valve mechanism.

3. In a thermostatic regulator, a back member having fluid inlets for hot and cold fluid and valve mechanism for controlling flow of said fluids, and a front member having a control shaft, a thermostatic element secured at one end to said shaft, and having an operating element at the other end of said thermostatic element rotatably mounted on said control shaft and operatively connected to said valve mechanism, and a thrust bearing in said back member for the end of said control shaft.

4. In a thermostatic regulator, a back member having fluid inlets for hot and cold fluid and valve mechanism for controlling flow of said fluids, and a front member having a control shaft, a thermostatic element secured at one end to said shaft, and having an operating element at the other end of said thermostatic element rotatably mounted on said control shaft and operatively engaging said valve mechanism, and a thrust bearing in said back member for the end of said control shaft.

5. In a mixing valve, a mixing chamber, an outlet chamber adjacent thereto and separated therefrom by a partition, a thermostatic chamber freely communicating with the mixing and outlet chambers, means comprising a tubular conduit device having a central partition and ports on each side of said partition for conducting a hot and a cold fluid into said mixing chamber, valve mechanism for controlling the relative quantities of said fluids, and thermostatic means in said thermostatic chamber operatively controlling said valve mechanism.

170

6. In a mixing valve, a mixing chamber, an outlet chamber, a thermostatic chamber freely communicating with the mixing and outlet chambers, means comprising a tubular conduit device having a central partition and ports on each side of said partition for conducting a hot and a cold fluid into said mixing chamber, valve mechanism slidably mounted on said tubular conduit device for controlling the relative quantities of said fluids, said valve mechanism comprising conical deflector elements positioned adjacent said ports and inclined to direct the hot and cold fluids from said ports towards each other, and thermostatic means in said thermostatic chamber operatively controlling said valve mechanism.

FREDERICK C. LEONARD.
GERMAIN ROSS.

120

July 5, 1938. H. J. YOUNG **2,122,600**

SHOWER MIXER

Filed Sept. 30, 1935

Fig. 2

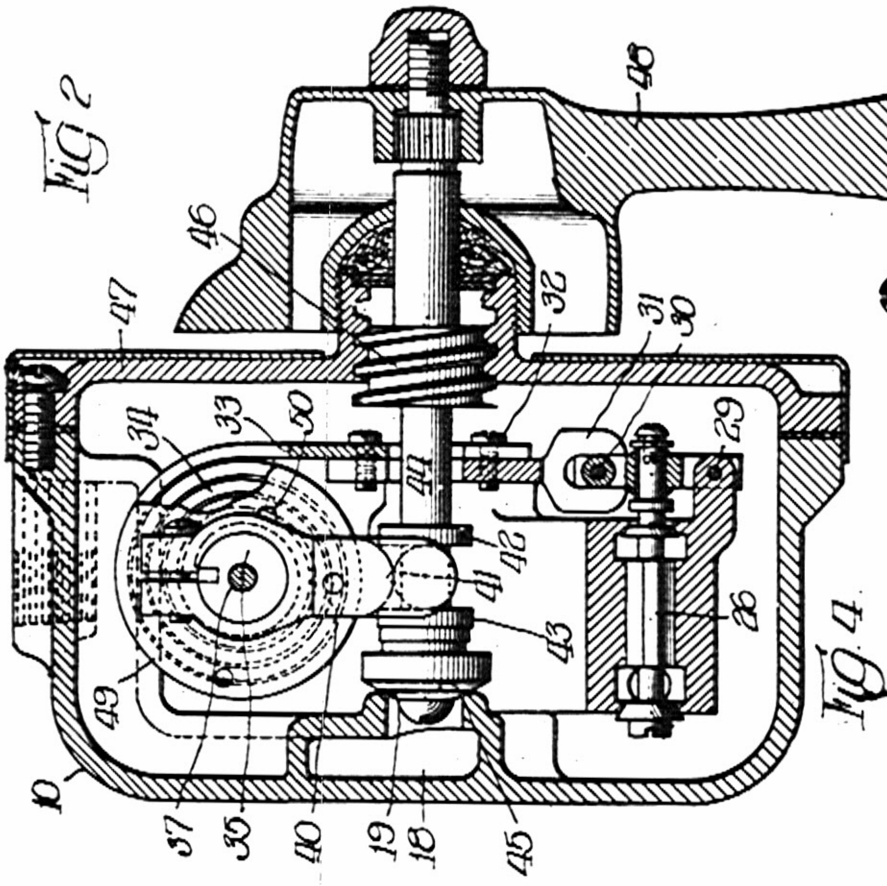


Fig. 4

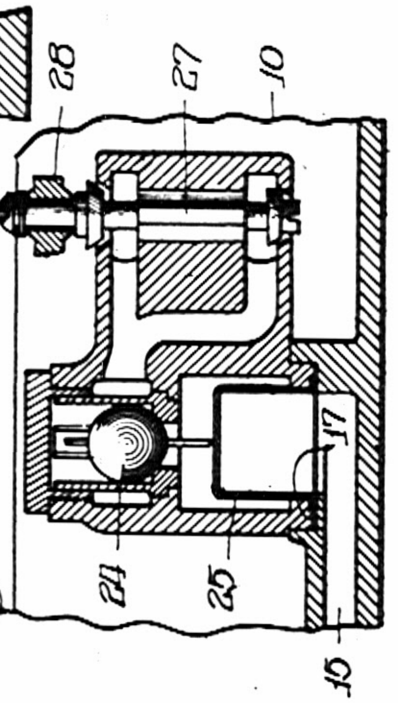


Fig. 1

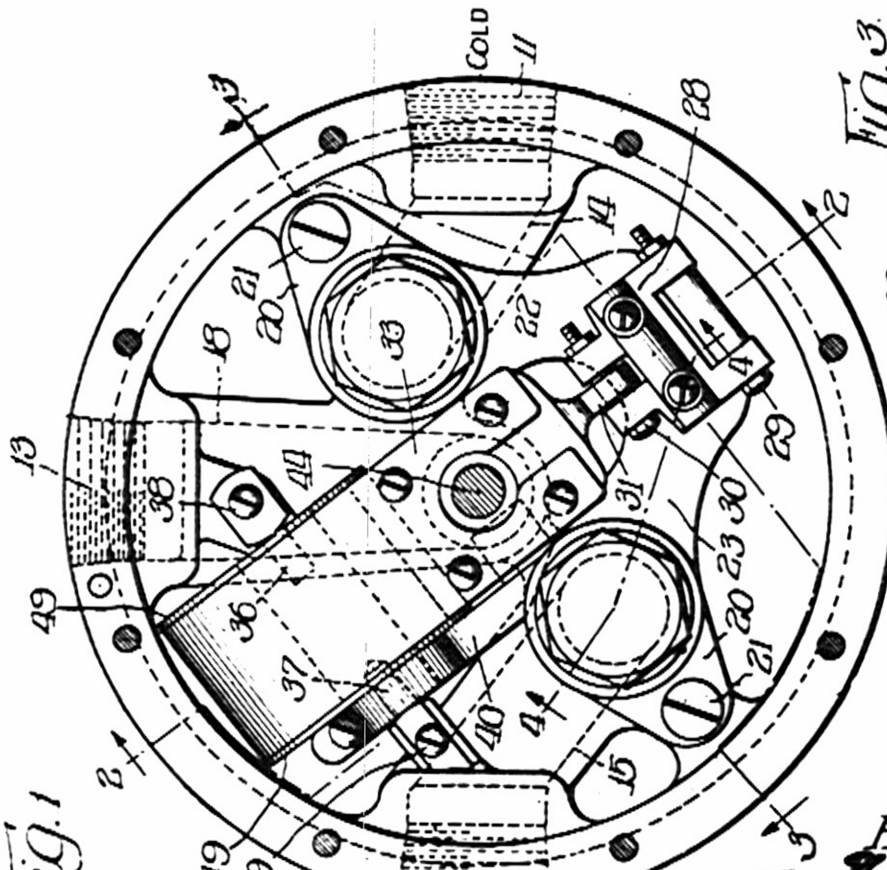
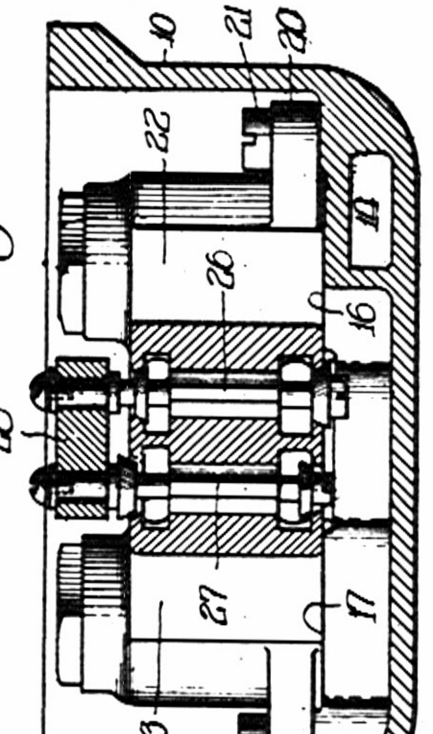


Fig. 3



Inventor:
Howard J Young,
By Morris & Morris
Att'ys.

UNITED STATES PATENT OFFICE

2,122,600

SHOWER MIXER

Howard J. Young, River Forest, Ill., assignor to
The Powers Regulator Company, Chicago, Ill.,
a corporation of Illinois

Application September 30, 1935, Serial No. 42,733

9 Claims. (Cl. 236—12)

My invention relates to a device for automatically controlling the discharge temperature of intermixed hot and cold fluids.

An object of my invention is to provide a mixer of extremely simple construction and arrangement, and adapted to be economically manufactured; one that will not readily become out of order but which, in the event of the necessity for adjustment or replacement of parts, is readily accessible by the use of ordinary tools.

I have found it desirable for several reasons to utilize a coiled bimetal thermostatic element, not only for its permanency but for its simplicity in construction, installation and operation; furthermore, by the use of this type of thermostatic element I am able to construct a mixer without the use of any springs. The construction, likewise adapts itself to a most desirable form of control and regulation, in that I am able to utilize a single, manually controlled valve element for opening and closing the outlet passage from the mixer and for effecting the desired temperature regulation of the outgoing mixture.

As a further advantage in operation, I provide a balanced valve construction, so that the valve action is not affected by variations in the supply pressure. Other advantages and features of novelty will be pointed out hereinafter.

The invention will be more readily understood by reference to the accompanying drawing, in which,

Fig. 1 is an elevation of a shower mixer constructed in accordance with my invention, the cover plate being removed;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, and

Figs. 3 and 4 are sectional views on the lines 3—3 and 4—4 of Fig. 1.

Referring to the drawing, it will be seen that there is provided a casing 10, having inlet openings 11—12 for cold and hot fluids respectively and an outlet 13 for mixed fluids. The opening 11 communicates with a cored passage 14, while the opening 12 communicates with a cored passage 15 which passages terminate in faced seats 16—17 respectively. The outlet 13 communicates with a cored passage 18 terminating in a valve seat 19 as best shown in Fig. 2.

The regulating mechanism includes a casting having ears 20 through which screws 21 are projected in order to secure the casting against the wall of the casing. The casting consists of a cored body having two hollow arms 22—23 with enlargements at their ends, the enlargements each containing a check valve 24 and a screen 25, the lower faces of the enlargements being shaped to fit the respective seats 16—17 on the casing. At the junction of the arms the passages terminate in outlets to the space within the casing, the outlets being controlled by parallel, reciprocating, balanced valves 26—27. It will be noted that the valves are oppositely faced and that when the valves are moved in unison one is opened as the other is closed. The upper ends of the valves are connected to a lever 28 fulcrumed on a pivot pin 29 and arranged as a lever of the second order. When properly adjusted, as shown in the drawing, the total flow of hot and cold fluids past the two valves is substantially uniform at all times; that is, as the flow of one fluid is increased the flow of the other fluid is correspondingly decreased and the volume of flow is unchanged by any manipulation of the hand controller, except by restricting the outlet opening to the point of use.

At the free end of the lever 28 is a pin and roller 30 adapted to be engaged by a yoke 31 fixed by means of screws 32 to the tangential end 33 of a coiled bimetal thermostatic element 34. In its inner end this element is bent to enter a slot in a core 35, the core being pivoted on short stub shafts 36—37, the outer ends of which are held by screws 38—39 on the wall of the casing. To a projecting portion of the core 35 is secured an arm 40 having a boss 41 thereon. This boss is intended to lie between the annular flanges 42—43 formed on a stem 44. On the inner end of the stem is mounted a valve 45 that controls the outlet passage 18 by cooperating with the valve seat 19. The stem is provided with threads 46 that engage with the threaded axial opening in the cover plate 47, while an adjusting handle 48 with a pointer adapted to cooperate with a dial in the usual manner, is provided for controlling the stem. It will be noted that the stem projects through an opening in the tangential end of the thermostatic member, the opening being sufficiently large to avoid any conflict between the two parts in their respective movements.

In operation it will be seen that on rotating the handle and stem the valve 45 is moved away from its seat permitting the passage of the requisite volume of cold water to a shower or other point of use. As the stem is moved outward under the action of the screw, the arm 40 is likewise moved and the core 35 is rotated, placing the thermostatic coil under a tension tending to cause its tangential end to close the cold water valve and open the hot water valve. As the temperature increases or fluctuates from

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that indicated by the setting, the bimetal coil will in due time correct the valve setting to restore the predetermined temperature for the outgoing fluid.

When the stem is rotated to close the outlet valve, the core of the thermostat is rotated, thus swinging the tangential end thereof and closing the hot fluid inlet (to the extent that it is at that time open) and correspondingly opening the cold fluid inlet. This does not change the total inlet area of the valves. It will be seen that the hot and cold fluids enter the chamber formed by the hollow interior of the casing from both sides of the casting; that is, past both of the valve seats—assuming that the respective valve is not entirely closed. Thus the fluids mix thoroughly and as the whole interior of the casing is filled with the mixed liquids, the thermostat is instantly affected by any change in the temperature. The arrangement of the thermostatic coil is such that the coil expands as the temperature is lowered and the tangential end moves angularly outward, tending to carry with it the arm **28** to which the valves are attached. The clearance in one direction between the yoke **31** and the pin and roller **30**, together with the capacity for relative rotation permits the necessary adjustment of the end to the peculiar motion that follows a change of dimensions of the coil. In this manner I am able to translate the rotary motion of the coil to a motion that is sufficiently rectilinear to effect the necessary valve adjustment.

In order to avoid "hunting"—that is, constant motion of the valves, I provide the shield plates **49** on both sides of the coil, closing the open ends thereof and include one or more perforations **50**, in the discs **49**, as may be necessary to restrict the flow of water round the coil and thus retard the response of the thermostat to changes in temperature.

The device is sure and accurate in action, is substantially unaffected by changes in pressure and will operate through long periods without attention. If necessary to clean the screen or provide other minor repairs, it is only necessary to remove the handle and cover, then remove the screws **21**—**38**—**39**, when the whole operating mechanism may be bodily lifted from the casing. By the removal of screws **21** the valve assembly casting can be removed without disturbing the thermostatic coil or operating stem.

Inasmuch as modifications will readily suggest themselves to others, I wish it understood that I am not to be limited except as indicated in the appended claims.

I claim:

1. In combination, a casing having inlets for hot and cold fluids and an outlet for the mixed fluids, a pair of parallel reversely positioned valves respectively controlling the entrance of hot and cold fluids to said casing; a lever of the second order connected to said valves whereby movement of said lever serves to open one valve to the extent that it closes the other valve, a thermostatic element within said casing and connected to said lever, a manually movable valve for controlling the outlet passage for the mixed fluids, and a connection between said manually movable valve and said thermostat for effecting adjustment of the thermostat, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

2. In combination, a casing having inlets for hot and cold fluids and an outlet for the mixed fluids, a pair of reversely positioned valves respectively controlling the entrance of hot and cold fluids to said casing, a bimetal thermostat within said casing, an end of which thermostat is connected to said valves whereby movement of the thermostat serves to open one valve to the extent that it closes the other valve, a manually movable valve for controlling the outlet for the mixed fluids, and a connection between said manually movable valve and said thermostat for effecting adjustment of the thermostat, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

3. In combination, a casing having inlets for hot and cold fluids and an outlet for the mixed fluids; a pair of reversely positioned valves respectively controlling the entrance of hot and cold fluids to said casing, a bimetal coiled thermostat pivotally mounted in said casing an end of which thermostat is connected to said valves, whereby movement of the thermostat serves to open one valve to the extent that it closes the other valve, a manually movable valve for controlling the outlet passage for the mixed fluids, and a connection between said manually movable valve and the pivot on which said thermostat is mounted for effecting adjustment of said thermostat, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

4. In a mixer, a combination of a casing having inlets for hot and cold fluids and an outlet for the mixed fluids, balanced valve means controlling the entrance of hot and cold fluids to said casing, a thermostat coil pivotally mounted within the casing and connected to said inlet valve means at its free end, a manually movable valve for controlling said outlet passage, and means connecting said manually movable valve to the pivot for said thermostat whereby movement of said manually movable valve serves to change the adjustment of said thermostat by rotating the same on its pivot, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

5. In combination, a casing having inlets for hot and cold fluids and an outlet for the mixed fluids, balanced valve means for controlling the entrance of hot and cold fluids to said casing, a coiled bimetal thermostat within said casing, a tangential end of which is connected to said valve means whereby movement of said valve means by said thermostat serves to open one valve to the extent that it closes the other valve, said thermostat being mounted for rotation on its axis, a manually movable valve having a stem for controlling the outlet for the mixed fluids and a connection between said stem and the mounting for said thermostat whereby movement of said stem tends to rotate said thermostat, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

6. In combination, a casing having inlets for hot and cold fluids and an outlet for the mixed fluids, a pair of parallel reversely positioned valves for controlling the entrance of hot and

cold fluids to said casing, a coiled bimetal thermostat within said casing, a tangential end of which is connected to said valves whereby movement of said valves by said thermostat serves to open one valve to the extent that it closes the other valve, said thermostat being mounted for rotation on its axis, a manually movable valve having a stem for controlling the outlet for the mixed fluids and a connection between said stem and the mounting for said thermostat whereby movement of said stem tends to rotate said thermostat, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

7. In combination, a casing having inlets for hot and cold fluids and an outlet for the mixed fluids, valve means for controlling the entrance of hot and cold fluids to said casing, a coiled bimetal thermostat within said casing, a tangential end of which is connected to said valve means whereby movement of said valve means serves to open one valve to the extent that it closes the other valve, said thermostat being mounted for rotation on an axial pivot, a manually movable valve having a stem for controlling the outlet passage for the mixed fluids, said valve stem being threaded and mounted within the casing, an arm connected to the pivot for said thermostat, said arm being connected to the manually movable valve stem whereby axial movement of the stem to open and close the outlet tends to rotate said thermostat and effect adjustment thereof, the movement of the thermostat by movement of said manually movable valve toward closing position serving to close the hot fluid inlet and open the cold fluid inlet.

8. In a shower mixer, the combination with a casing, having valves for controlling the entrance of hot and cold fluids, a coiled bimetal thermostat for controlling the position of said valves, and means partially covering the open ends of said coiled thermostat whereby to shield the thermostat and retard its action under the influence of the temperature of the fluids passing through the casing.

9. In combination, a casing having hot and cold fluid inlets and a mixed fluid outlet, balanced valves controlling the hot and cold fluid inlets to the casing, a coiled bimetal thermostat within the casing, said coil having a tangential end directly connected to said valves for operating the same, a shut-off valve for controlling the outlet of the mixed fluids from the casing, said valve having a stem, said thermostat being mounted on a core for rotation and means connecting said stem and said core whereby longitudinal movement of the stem effects rotation of said core for changing the adjustment of said thermostat and swinging the tangential end thereof to change the positions of said valves.

HOWARD J. YOUNG.

Oct. 10, 1939. F. C. LEONARD **2,175,203**

THERMOSTATIC MIXER

Filed Aug. 17, 1936

124

Fig. 1.

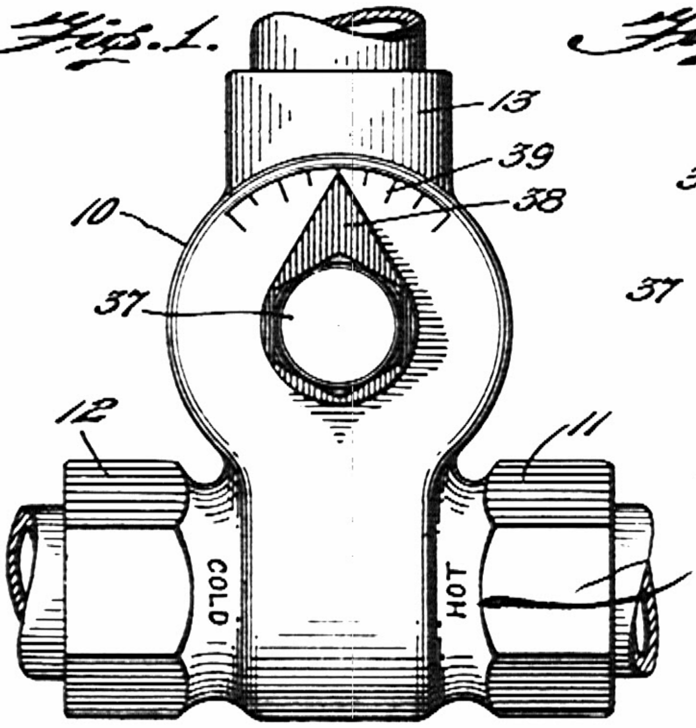


Fig. 2.

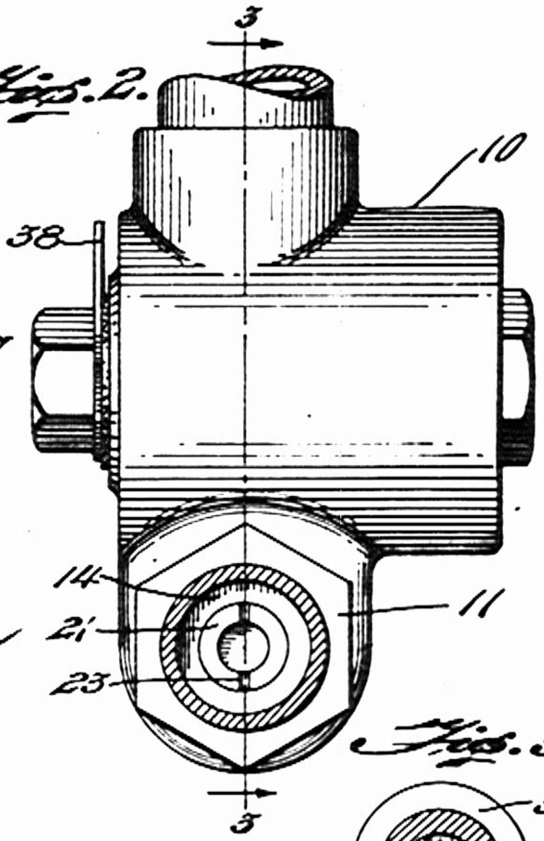


Fig. 5.

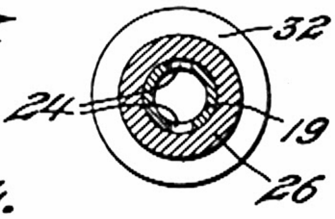


Fig. 3.

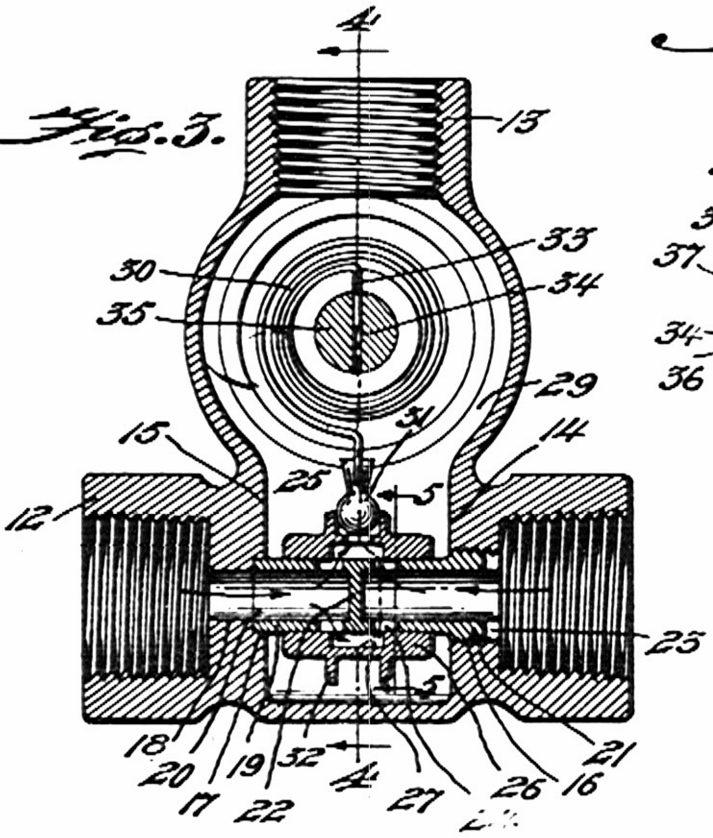
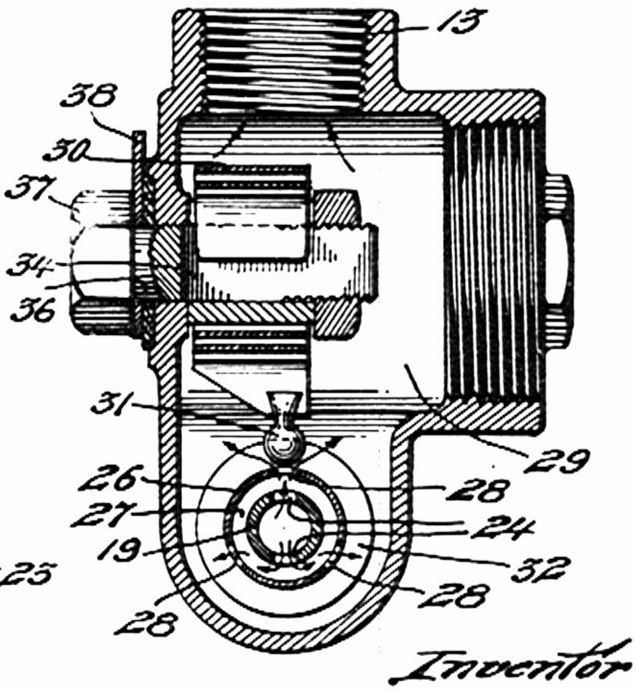


Fig. 4.



Inventor

Frederick C. Leonard

By Nathaniel Frucht

Attorney

176

Patented Oct. 10, 1939 2,175,203

UNITED STATES PATENT OFFICE

2,175,203

THERMOSTATIC MIXER

Frederick C. Leonard, Cranston, R. I.

Application August 17, 1936, Serial No. 96,335

4 Claims. (Cl. 236—12)

My present invention relates to the thermostatic art and has particular reference to a novel thermostatic valve construction which utilizes easily manufactured and assembled parts.

It is the principal object of my invention to devise a thermostatic valve construction using a small number of parts, the total moving parts being two in number, whereby the cost of manufacturing and assembly is greatly reduced, and the price of the valve to the user is greatly lowered.

It is a further object of my invention to provide a novel mixing chamber of annular formation.

It is an additional object of my invention to provide a construction having a balanced valve arrangement.

With the above and other objects and advantageous features in view, my invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawing, and more specifically defined in the claims appended thereto.

In the drawing:

Fig. 1 is a front elevation of the novel valve showing the setting arrangement;

Fig. 2 is a side elevation thereof;

Fig. 3 is a vertical section thereof on the line 3—3 of Fig. 2 showing the internal construction of the valve and the assembly of the parts;

Fig. 4 is a section on the line 4—4 of Fig. 3; and

Fig. 5 is a detailed section on the line 5—5 of Fig. 3.

Referring to the drawing, the novel valve construction includes a casing 10, preferably of brass, which has secured thereto, or if preferred formed integral therewith, two inlet connections 11 and 12 threaded to receive hot and cold water inlet pipes, and an outlet connection 13 which is threaded to receive a mixed fluid pipe, the inlet connections being in opposed relation. As best shown in Fig. 2, the base of the casing has two side walls 14, 15, the side wall 14 having an internally threaded bore 16 and the side wall 15 being recessed as indicated at 17 and having an opening 18, whereby a cylindrical valve housing 19 of non-corrosive metal may be mounted in the casing with its inner ends 20 seated in the recess 17 and its head end 21, preferably of greater diameter, threaded to seat in the internally threaded bore 16; a central partition 22 is provided in the housing 19 to separate the hot and cold fluid, and the walls of the head end are slotted as at 23 for the engagement of a screw-driver or similar mounting tool. As shown in Figs. 2 and 4, the housing has two diametrically opposite ports 24 on one side of the partition 22 and two aligned diametrically opposite ports 25 on the other side of the partition 22, whereby the incoming hot and cold fluid enters the housing in opposed relation and passes outwardly through the ports 24 and 25. A sliding sleeve valve 26 of non-corrosive metal is mounted to slide on the housing 19, and has an inner annular recess 27 which serves as a mixing chamber, the outer wall of the said recess having a plurality of ports 28; the preferred construction has three such ports spaced at 120°, whereby the hot and cold fluids emerging from the ports 24 and 25 enter into the annular mixing chamber and emerge in mixed condition through the outlet ports 28 to enter the thermostatic chamber 29.

The actuation of this valve in a lateral direction controls the relative amounts of hot and cold fluid admitted to the mixing chamber; this control is effected automatically by means of a thermostatic coil 30, which has its lower end turned to terminate in a ball shaped finger 31 which may be integral therewith or formed separately and secured thereto, the finger being positioned between spaced annular upstanding flanges 32 formed on the exterior surface of the sleeve valve 26, and preferably on each side of the outlet ports 29, whereby the spaced flanges function as an annular outlet guide for the mixed fluid. The inner end 33 of the coil is bent as shown in Fig. 2, and is seated in a radial slot 34 of a control shaft 35, the outer end 36 of the control shaft being reduced in size and threaded as indicated in Fig. 3 to receive an internally threaded nut member 37 to which a pointer element 38 is preferably secured, the pointer element 38 cooperating with graduations 39 on the outer face of the casing 10.

The manufacture and assembly of the novel construction, and the operation of the assembled valve, may now be explained. The valve consists of an outer casing, in which is fixed a cylindrical valve housing, a slide valve of the sleeve type being mounted on the valve housing; an adjustable shaft extends into the casing and has one end of a thermostatic coil secured thereto, the other end of the thermostatic coil being movable in response to changes in temperature of the mixed fluid in the thermostatic chamber for shifting the slide valve so as to control the relative amounts of hot and cold fluid admitted to the mixing chamber, the mixed fluid emerging from the annular mixing chamber through the annularly positioned ports and the annular guide groove into the thermostatic chamber. The mixed fluid fills the thermostatic chamber, thus acting on the thermostatic coil, and outflows through the outflow conduit **13**. With the shaft set in the position indicated in Fig. 1, the pointer points at the central graduation, and the thermostatic coil is set for a definte temperature of mixed fluid; any variation in the temperature of the mixed fluid will cause a movement of the thermostatic coil and a lateral shift of the slide valve so as to regulate the volume of hot and cold fluids to again bring the mixed fluid to the desired temperature. If a different mixed fluid temperature is desired, the shaft **35** is rotated by turning the end **37**, a slot **40** being provided to facilitate this turning by means of a screwdriver or similar tool, the pointer **38** being shifted to one side or the other so as to correspond with a different graduation **39**; the temperature of the mixed fluid is then controlled by the thermostatic coil so as to correspond to this set temperature.

It is thus evident that the apparatus has but two moving parts, namely, the thermostatic coil and the slide valve, and but one adjustable part, namely the shaft **35**, whereby the manufacture of the novel thermostatic valve, the assembly thereof, and its adjustment is greatly facilitated.

The use of a slide valve of the type described thus produces a balanced valve arrangement in which the effect of differences in pressure of the hot and cold fluids is minimized; the annular mixing chamber and its spaced ports result in a mixing that is substantially complete, but has sufficient temperature variations to keep the thermostatic coil active, the mixing being finally completed to a uniform temperature in the thermostatic chamber.

While I have described a specific constructional embodiment of my invention, any changes in the size, dimensions, and relative proportions of the various parts, and in their materials, may be made to suit the requirements for different valve installations, without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. In a valve construction, a casing having a thermostatic chamber, opposed hot fluid and cold fluid inlet openings, and an outlet opening from said thermostatic chamber for mixed fluid, a tubular ported member having a partition and end passageways communicating with said inlet opening and outflow ports, a valve mounted on said member and having a mixing chamber in communication with said outlet ports and movable to simultaneously decrease flow through one outflow port for one fluid and increase flow through the other outflow port for the other fluid, said mixing chamber having a mixed fluid outlet port communicating with said thermostatic chamber, thermostatic means in said thermostatic chamber responsive to variations in temperature of the mixed fluid and operatively connected to said valve, and means for adjustably setting said thermostatic means.

2. In a valve construction, a casing having a thermostatic chamber, opposed hot fluid and cold fluid inlet openings, and an outlet opening from said thermostatic chamber for mixed fluid, a tubular ported member having a partition and end passageways communicating with said inlet openings and outflow ports, a valve slidably mounted on said member and having a mixing chamber in communication with said outlet ports and reciprocatable to simultaneously decrease flow through one outflow port for one fluid and increase flow through the other outflow port for the other fluid, said mixing chamber having a mixed fluid outlet port communicating with said thermostatic chamber, thermostatic means in said thermostatic chamber responsive to variations in temperature of the mixed fluid and operatively connected to said valve for reciprocation thereof in response to changes in temperature of said mixed fluid, and means for adjustably setting said thermostatic means.

3. In a valve construction, a casing having a thermostatic chamber, opposed hot fluid and cold fluid inlet openings, and an outlet opening from said thermostatic chamber for mixed fluid, a cylindrical ported member having a partition and end passageways communicating with said inlet openings and outflow ports, a valve mounted on said member and having an annular mixing chamber in communication with said outlet ports and movable to simultaneously decrease flow through one outflow port for one fluid and increase flow through the other outflow port for the other fluid, said mixing chamber having a mixed fluid outlet port communicating with said thermostatic chamber, thermostatic means in said thermostatic chamber responsive to variations in temperature of the mixed fluid and operatively connected to said valve, and means for adjustably setting said thermostatic means.

4. In a valve construction, a casing having a thermostatic chamber, opposed hot fluid and cold fluid inlet openings, and an outlet opening from said thermostatic chamber for mixed fluid, a cylindrical ported member having a partition and end passageways communicating with said inlet openings and outflow ports, a valve slidably mounted on said member and having an annular mixing chamber in communication with said outlet ports and reciprocatable to simultaneously decrease flow through one outflow port for one fluid and increase flow through the other outflow port for the fluid, said mixing chamber having a mixed fluid outlet port communicating with said thermostatic chamber, thermostatic means in said thermostatic chamber responsive to variations in temperature of the mixed fluid and operatively connected to said valve for reciprocation thereof in response to changes in temperature of said mixed fluid, and means for adjustably setting said thermostatic means.

FREDERICK C. LEONARD.

181 U S Patent Office March 30 1942 Mailed

Department of Commerce
United States Patent Office
Richmond, Va.

Div. 30 Paper No. 7
ADS:HEM

Before the Board of Appeals
On Appeal

In re application
Frederick C. Leonard
Serial No. 362,045
Filed: Oct. 21, 1940
Title: Thermostatic Mixing Valve

Examiner's Statement

This is an appeal from the final rejection of claims 11 to 15, inclusive, all the claims in the case.

The claims:

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the portition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively

connected to move said valve upon changes of temperature of the mixed fluid.

12. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening ex-
182 tending on both sides of the partition and over said
wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; the ends of said valve being tapered, said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

13. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; at least one end of said valve seat having a limit stop for said valve,

said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

14. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through a wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger, and said valve having a stem universally connected to said finger.

183 15. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permit-

ting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid, said thermostat comprising a coil having its inner and manually settable and having its outer end provdied with a finger having an enlarged tip, and said valve having a cylindrical stem provided with an elongated slot for said finger and housing the enlarged tip thereof.

The references relied upon:

Leonard	2,175,203	Oct. 10, 1939
Leonard	2,110,884	Mar. 15, 1938
Leonard	1,957,276	May 1, 1934
Johnson	1,127,627	Feb. 9, 1915
Young	2,122,600	July 5, 1938
Henneuse	1,845,499	Feb. 16, 1932
Kenney	1,980,624	Nov. 13, 1934

Applicant's device is a thermostatic mixing valve which has a body, or "base", 11 having an inlet opening 14 (figure 3) for hot fluid and an inlet opening 15 for cold fluid. A tubular valve seat 21 having a central partition 22 and outflow ports 23 and 24 for the hot and cold fluids respectively is mounted between and in direct communication with the inlets 14 and 15.

Surrounding the tubular seat 21 is a tubular valve 26 having two central flow openings 27 which are sufficiently wide to allow flow from both inlets. The ends 28 are bevelled, it being stated that such bevelling eliminates surging.

The valve is provided with a tubular stem 30 having
184 a longitudinal slot 31 for receiving the ball end 32 of
an operating lever 33. The lever 33 (figure 2) is

attached to an extension plate 35 integral with a hub 36 rotatably mounted on a second hub 37 which in turn is mounted on a fixed shaft 38 threaded into the plate 12. A thermostatic coil 39 has ''its inner end 40 keyed to the hub 36 and its outer end 41 secured to an arm 42 which is preferably integral with the hub 37'' which is keyed to a gear 43. A smaller gear 44 is keyed to the reduced inner end of a control shaft 45, and meshes with the gear 43. Movement of the gear 44 by means of handle 46 shifts the outer end of the thermostat to change the temperature setting in an obvious manner. The thermostat and valve operating mechanism being located close to the plate 12 is said to provide ''an unusually free flow for the hot and the cold fluids from the inlets to the outlet.''

This device acts in the usual manner of thermostatic fluid mixing valves, i. e., when the temperature of the mixture becomes too high the thermostat acts to shift the valve so that more cold water is admitted through ports 24 and less hot water through ports 23—and in the opposite direction if the temperature drops too low.

The Reference Leonard 2,175,203 shows a thermostatic mixing valve having a body 10, with inlet openings 11 and 12 for the hot and cold liquids respectively. Tubular valve seat 19, having a central partition 22, and outflow ports 24 and 25 for the hot and cold fluids respectively is mounted between and in direct communication with the inlets 11 and 12. Surrounding the tubular seat 21 is a tubular valve 26 having a central flow opening 27 with three outlets 28. The valve 26 is provided with ''spaced annular upstanding flanges 32 formed on the exterior surface.'' A
185 thermostatic coil 39 has its inner end 33 seated in a slot
in a manually adjustable control shaft 35. The outer end of the thermostat carries a ball ended finger 31 which extends between the flanges 32 so that thermal movement of the thermostat may shift the valve 26 to vary the relative flows through ports 24 and 25 and maintain the temperature of the mixed water substantially constant.

The reference Leonard 2,110,884 (see figures 1 to 6 inclusive) shows a thermostatic mixing valve having inlets 18 and 19 (figure 4) and a tubular valve seat 28 having a central partition 29 and outflow ports 30 and 31 (figure 6) which cooperate with the tapered or conical ends 33 of tubular valve member 32 having the circumferential groove 34 which receives the ball end of lever finger 48 of thimble 46 which is secured to the inner end of thermostatic element 35 which has its outer end attached to the end 44 of the arm 43 which is manually adjustable by handle 49 acting through the shaft 36. The operation of this device will be obvious.

The reference Leonard 1,957,276 was cited merely to show that it is old to provide stop pins to limit movement of a mixing valve. See figures 13 to 15 for example which show stop pin 93 which cooperates with projections 90 of the slot 92 on the lower end of the rotatable tubular valve, or ''hub'', 86, to limit the movement given to the valve by the thermostat. Attention is also directed to the modification shown in figures 16 and 17 wherein a stop pin 112 cooperates with lugs 110 and 111 on the rotatable plate valve 107 to limit the rotation thereof which is effected by a thermal element. It will be noted of course that the valves in this reference are rotatable rather than reciprocatable as in the other Leonard patents cited. However, the use of stop
186 means on any type valve is an obvious expedient.

The references Johnson and Young were cited merely to show that it is old in the art to place the thermal element of a thermostatic mixing valve in a recess so that it is offset from the direct flow of the mixed liquid. The Johnson thermal element and valve structure are obviously different from applicant's valve but the operation is similar and will be clearly understandable from the drawings.

The reference Henneuse shows a thermostatic mixing valve having inlet connections 5 and 6 each of which connects with long and narrow valve ports 15 located on opposite sides of the projection 10. A reciprocatable valve 16 having spaced legs 17 with oppositely opposed flat faces 18 engages opposite faces 11 and 12 of the projection 10, the width of the valve being equal to the distance between the ports 15 on one side of the projection 10 plus the width of one of the ports so that relative movement of the valve will cause one pair of ports 15 to be completely open when the other is completely closed. The "U" shaped bimetal element 27 acts, upon temperature change, to reciprocate the valve 16 between the ports to proportion the flows of hot and cold water to correct the temperature of the mixed water. It will be noted from the drawings that the ends and sides of the valves are definitely tapered. Attention is also directed to the stop pins 43 located on opposite ends of the valves which are for the purpose of "restraining or limiting excessive movement of the valve 16 which might otherwise occur during the initial setting of the regulator."

187 The reference Kenney was cited merely to show that it is old in the art to reciprocate a mixing valve 38 (of figure 6) by means of an arm 39 having a cylindrical groove therein (clearly shown at the outer end of the arm 39) which receives the ball 15 on the end of the thermostatically operable rod 16.

Claims 11 to 15 inclusive were rejected as lacking invention over Leonard 2,175,203 especially in view of one or more of the secondary references as specifically set forth below. The following tabulation will serve to show the points of similarity and differences between the application and the reference Leonard 2,175,203.

Elements of Claim 11	Application	Leonard 2,175,203 patent
(a) A body constituting a mixing chamber	11-12	10
(b) Spaced aligned hot and cold fluid inlets	14-15	11-12
(c) Mixed fluid outlet	54	13
(d) Tubular valve seat	21	19
(e) Central partition	22	22
(f) Ports closely adjacent the partition	23-24	24-25
(g) Tubular valve	26	26
(h) A wall opening extending on both sides of the partition and over the ports	27-27	27-28
(i) A recess in the body at one side of the mixing chamber out of the direct flow of the fluid	(No reference Numeral) See the left side of the body in Fig. 2	(No reference Numeral) See the left side of the body in Fig. 4
(j) A thermostat mounted in the recess and operatively connected to move the valve	39	30

188 It will be seen that each of the elements a, b, c, d, e, f, g and j of the application clearly finds its full equivalent in the patent. The only possible differences are then in the elements h and i. Applicant contends that the wall opening 27 of Leonard 2,175,203 is a mixing chamber and thus not comparable to the wall openings 27 of the

application. The examiner believes that the openings 27 and 28 of the patent together provide the full equivalent of the openings 27-27 of the application. It is true that the openings 28 of the patent are of less extent in area than the opening 27 of the patent. However it is obvious that the flow from the ports 24-25 of the patent to the chamber housing the thermostat is substantially as direct as the flow from the ports 23-24 of the application to the chamber housing the thermostat therein. Furthermore, it seems quite obvious that if more flow is desired through the patent device, than the openings 28 will pass they may be enlarged to any degree desired without the exercise of invention. This would merely reduce the amount of mixing taking place in the space 27 and increase the proportion of mixing occurring after the fluids leave the valve. Such would be an obvious result to one of nominal skill in the art. The only other possible distinction is in the recitation that the thermostat is in "a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports (27) to the mixed fluid outlet." It will of course be noted that the thermostat 30 of the patent is not aligned with the axis of the valve (see figure 4) and thus is somewhat offset from the axis of the valve and outflow port 13. To offset the thermostat still more, if it is found to interfere with the flow of water (or vice versa) would appear to be an obvious mechanical expedient. Young and Johnson each show that it is old in the art to fully offset the thermostat
189 from a direct line of flow through a thermostatic mixing valve. To thus offset the Leonard 2,175,203 would involve no more than a minimum of mechanical skill and would not appear to produce any new or unexpected result.

Claim 12 differs from claim 11 only in reciting that the ends of the valve (26) are "tapered". Such limitation is not thought to provide a patentable distinction over Leonard 2,175,203 wherein the ends of valve 26 appear to be slightly rounded or tapered. Further rounding or tapering would seem to be an obvious expedient as suggested by each of Leonard 2,110,884 and Henneuse in which the reciprocating valve members clearly have their ends tapered.

Claim 13 differs from claim 11 only in reciting "at least one end of said valve seat (21) having a limit stop (25) for said valve" (26). Such limitation does not appear to define over Leonard 2,175,203 in which the valve 26 will obviously be stopped satisfactorily by each of side walls 14 and 15. However, if it is desired to stop the valve before it reaches either of said side walls no invention would be required to provide separate stop means for such purpose. See each of Henneuse and Leonard 1,957,276 which show that it is old to provide stop pins to limit the movement of mixing valves. In Henneuse the pins 43 limit reciprocation of the valve in both directions. In Leonard 1,957,276 figure 13, for example, pin 93 limits rotation of the valve 86 in both directions.

Claim 14 differs from claim 11 only in adding "said thermostat comprising a coil having its inner end manually settable and having its outer end provided with a finger, and said valve having a stem universally connected to said finger." Applicant's attention was called to the fact that this limitation reads more clearly upon Leonard 2,175,203
190 than upon the device of the application since in the
application the inner end of the thermostatic coil 39 is not manually settable, nor the outer end of the thermostatic coil provided with a finger connected through a stem to the valve. See the paragraph of the applicant's specification beginning on line 22 of page 4 which points out that applicant's thermostat has its inner end keyed to the hub 36 which bears arm 35 which in turn operates the valve. It is the outer and not the inner end of the thermostatic coil that is manually settable in the application. However, even if the claim had been amended to be accurate in this respect it would not be patentable over Leonard 2,175,203 in view of Leonard 2,110,884 in which manual adjustment of the outer end of a thermostatic spiral is shown to be

the full equivalent of manual adjustment of the inner end.

Claim 15 differs from claim 14 only in stating that the finger of the universal connection has an "enlarged tip" and the valve (26) has a cylindrical stem provided with an elongated slot for the finger. Such mechanical connection does not appear to define over either Leonard 2,175,203 or Leonard 2,110,884 in which the enlarged tips 31 and 48 respectively operate in circular grooves which appear to be the full equivalent of cylindrical grooves such as shown by applicant and in the prior art by Kenney.

Applicant attempts to define over the reference Leonard 2,175,203 by small structural differences which would appear to be obvious to one of ordinary skill in the art and it is believed that the final rejection of claims 11 to 15 inclusive thereon was proper.

191 This application is a substantial duplicate of applicant's copending application S. N. 311,754 wherein the claims were finally rejected on the same references as used herein and which application became abandoned on Feb. 12, 1942.

L. P. McCANN
Examiner.

192 U S Patent Office Board of Appeals Jun 23 1942
Mailed

Appeal No. 42,297 Paper No. 10 MEM

In the United States Patent Office

Before the Board of Appeals

Ex parte Frederick C. Leonard

Application for patent filed October 21, 1940, Serial No. 362,045. Thermostatic Mixing Valve.

Mr. Nathaniel Frucht for applicant.

This is an appeal from the action of the examiner finally rejecting claims 11 to 15, inclusive.

Claim 11 is illustrative and reads as follows:

11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

The references relied upon are:

	Johnson	1,127,627	February 9, 1915
	Henneuse	1,845,499	February 16, 1932
193	Leonard	1,957,276	May 1, 1934
	Kenney	1,980,624	November 13, 1934
	Leonard et al	2,110,884	March 15, 1938
	Young	2,122,600	July 5, 1938
	Leonard	2,175,203	October 10, 1939

The invention is a thermostatically controlled hot and cold water mixing valve. The construction is fully set forth in the above claim.

The examiner has cited three Leonard patents. Two of these patents disclose constructions which are quite close to what appellant is claiming. The patent No. 2,175,203 is believed to be the most pertinent.

Appellant argues that it shows no mixing chamber but we think it does. The housing clearly forms a chamber in which the hot and cold water streams are mixed. The patent does not show the thermostat arranged in a recess so it will not be in the main line of flow to the outlet. However Johnson and Young cited show this feature and no invention would be involved in incorporating this feature into the Leonard patent. The Leonard patent No. 1,957,276 discloses the use of limiting pins for the valve disk. Hence no invention is involved in providing such pins to limit the movement of the sleeve valve in patent No. 2,175,203.

There appears to be no feature included in any claim which is not fully disclosed in the art cited. To embody features of other patents into the Leonard patents, particularly No. 2,175,203, so as to meet the claims is regarded non-inventive.

The decision of the examiner is affirmed.

E. T. MORGAN
Examiner-in-Chief

F. P. EDINBURG
Examiner-in-Chief

C. H. SHAFFER
Examiner-in-Chief
Board of Appeals

June 23, 1942

MR. NATHANIEL FRUCHT,
Hospital Trust Bldg.,
Providence, R. I.

194 U S. Patent Office Board of Appeals Jul 21 1942
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Appeal No. 42,297 Paper No. 12

In the United States Patent Office

Before the Board of Appeals

Ex parte Frederick C. Leonard

Application for Patent filed October 21, 1940, Serial No. 362,045. Thermostatic Mixing Valve.

Mr. Nathaniel Frucht for appellant.

On Request for Reconsideration

Appellant requests reconsideration of our decision. He particularly emphasizes the arrangement of the thermostat in a recess offset to one side of the chamber. This feature is old in Johnson and hence it would not be inventive to modify other patents in the same manner.

The request for reconsideration is denied.

E. T. MORGAN
Examiner-in-Chief

F. P. EDINBURG
Examiner-in-Chief

C. H. SHAFFER
Examiner-in-Chief
Board of Appeals

July 21, 1942

MR. NATHANIEL FRUCHT
Hospital Trust Bldg.
Providence, R. I.

UNITED
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA

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BRIEF FOR APPELLEE

United States Court of Appeals

DISTRICT OF COLUMBIA

APPEAL NO. 8851

LEONARD VALVE COMPANY AND FREDERICK C. LEONARD,
APPELLANTS

v.

CONWAY P. COE, COMMISSIONER OF PATENTS, APPELLEE

APPEAL FROM THE JUDGMENT OF THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

W. W. COCHRAN,
Solicitor, United States Patent Office,
Attorney for Appellee.

R. F. WHITEHEAD,
Of Counsel.

INDEX

Page
Introduction ---- 1
Statement of the Case ---- 1
Summary of Argument ---- 5
Argument ---- 6
Conclusion ---- 8
Authorities cited:
  Iwan, In re, 1901 C. D. 314, 17 App. D. C. 556 ---- 6, 8
  Magnaflux Corp. v. *Coe,* 78 U. S. App. D. C. 258, 139 F (2d) 531 ---- 8
  Pein, In re, 1914 C. D. 167, 41 App. D. C. 586 ---- 6

United States Court of Appeals

DISTRICT OF COLUMBIA

Appeal No. 8851

LEONARD VALVE COMPANY AND FREDERICK C. LEONARD,
APPELLANTS

v.

CONWAY P. COE, COMMISSIONER OF PATENTS, APPELLEE

APPEAL FROM THE JUDGMENT OF THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

INTRODUCTION

This is an appeal from the judgment (13)[1] of the District Court of the United States for the District of Columbia, dismissing the complaint (2) brought by appellants, Leonard Valve Company and Frederick C. Leonard, to obtain a patent on the application of Frederick C. Leonard, No. 362,045, entitled Thermostatic Mixing Valve.

STATEMENT OF THE CASE

The involved application relates to a thermostatic mixing valve. Such a valve is designed to control the mixing of water from a supply of hot water with that from a supply of cold water, the thermostatic element controlling the amount of flow from each source so that the water passing through the outlet pipe is at the desired temperature.

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[1] The numbers in parentheses throughout this brief, unless otherwise indicated, refer to pages of appellants' appendix.

In the device shown in the application the two pipes leading into the valve casing are connected by a tubular valve seat having a central partition therein with openings in the seat on each side of the partition and close thereto. A tubular valve having two central flow openings therein, which are of sufficient width to normally permit the flow of hot and cold water, is fitted over the seat. A thermostatic element is placed in the valve casing and so connected to the valve as to cause it to be adjusted in such a manner as to give the fluid flowing from the valve casing the desired temperature. The thermostat is placed in a recess in the casing so that it will be out of the direct line of the flow of water from the wall ports of the valve seat.

The examiner rejected all the claims then in the case, being claims 11, 12, 13, 14, and 15, and on appeal that action was affirmed by the Board of Appeals of the Patent Office.

All these claims were presented in the complaint but, at the trial, claims 13, 14, and 15 were withdrawn.

Claim 11 reads as follows:

> 11. In a thermostatic valve, a body constituting a mixing chamber and having spaced aligned hot and cold fluid inlets and a mixed fluid outlet, a tubular valve seat mounted in said body and provided with a central partition dividing the valve seat into two portions having

> their ends respectively communicating with the inlets, said portions having wall ports closely adjacent the partition, a tubular valve mounted on said seat and having a wall opening extending on both sides of the partition and over said wall ports when the valve is central, said opening permitting direct flow of fluid from said wall ports into the mixing chamber, and said valve being movable to increase flow of fluid through the wall ports of one portion and decrease the flow of fluid through the wall ports of the other portion; said body having a recess at one side of the mixing chamber out of the direct flow of fluid from said wall ports to the mixed fluid outlet, and a thermostat mounted in said recess and operatively connected to move said valve upon changes of temperature of the mixed fluid.

Claim 12 differs from claim 11 only in specifying that the ends of the valve are "tapered."

The examiner held claims 11 and 12 unpatentable over the prior art as shown in the following patents:

Leonard, 2,175,203, Oct. 10, 1939.
Leonard, 2,110,884, Mar. 15, 1938.
Leonard, 1,957,276, May 1, 1934.
Johnson, 1,127,627, Feb. 9, 1915.
Young, 2,122,600, July 5, 1938.
Henneuse, 1,845,499, Feb. 16, 1932.
Kenney, 1,980,624, Nov. 13, 1934.

In his answer to the appeal he said that the Johnson and Young patents were cited merely to show that it was old in the art to place the thermal element of a thermostatic mixing valve in a recess in the casing so that it is offset from the direct flow of the mixed liquids, that the Henneuse patent was cited to show the tapering of the ends of a thermostatic mixing valve and the Kenney patent was cited merely to show that it was old to reciprocate a mixing valve by means of an arm having a cylindrical groove therein [see arm 39 and ball 15].

After describing the devices of the other patents, he said:

> Applicant attempts to define over the reference Leonard 2.175,203 by small structural differences which would appear to be obvious to one of ordinary skill in the art and it is believed that the final rejection of claims 11 to 15, inclusive, thereon was proper.

The Board of Appeals in its decision (R. 88), after stating that the Leonard patent No. 2,175,203 was the most pertinent and that it clearly shows a mixing chamber, said that while that patent did not show the thermostat arranged in a recess in the valve casing so that it will not be in the main line of flow to the outlet, this feature was shown in the Johnson and Young patents and it would not be invention to incorporate this feature in the device of the aforesaid Leonard patent and then further said:

> There appears to be no feature included in any claim which is not fully disclosed in the art cited. To embody features of other patents into the Leonard patents, particularly No. 2,175,203, so as to meet the claims is regarded non-inventive.

The Justice of the District Court in his memorandum opinion (8) said:

> The patent office held that the mixing chamber was disclosed in an earlier patent to the plaintiff; that the arrangement of the thermostat in a recess offset to one side of the chamber was old in a patent to Johnson.
>
> It is obvious that there is no invention in making a larger valve to accommodate a greater flow of water.

He included in his findings of fact the following:

> 9. It was not invention to make a mixing valve larger than one previously used in order to accommodate a larger flow of water.
>
> 10. It was not invention in view of the disclosure of the Johnson patent No. 1,127,627, to place the thermostat of the Leonard patent No. 2,175,203 in a recess offset to one side of the valve chamber so that it will be out of the path of the direct flow of water through the valve.
>
> 12. Neither claim 11 nor claim 12, of the Leonard application, involved in the proceeding, defines an invention over the patents cited in defendant's answer.

SUMMARY OF ARGUMENT

1. It is not invention to merely make a prior device larger.

2. It is not invention to follow the teaching of the prior art.

3. The fact that a device is, in some particular respects, novel does not establish that its creation required invention.

ARGUMENT

Appellants in their brief lay great stress on the testimony that the mixing valve of Leonard's application was developed in view of a request that they build a valve particularly for use in a laundry and capable of handling 300 gallons of water a minute and that experimentation showed that a valve built exactly like the valve of the Leonard patent No. 2,175,203, but of larger size, was not satisfactory. It is urged that the prior patents cited by the Patent Office did not suggest the change which was made in mixing valves nor in the structure of the casing so as to place the thermostatic member out of the direct flow of the water.

It is well settled that merely to enlarge any device so as to give it a greater capacity is not invention (see *In re Iwan,* 1901 C. D. 344, 17 App. D. C. 556 and *In re Pein,* 1914 C. D. 167, 41 App. D. C. 586).

Obviously, it is not invention in so enlarging a device, to make changes which of themselves were not inventive, in order to make the enlarged device better adapted for use in its new position.

The valve of the Leonard patent No. 2,175,203, which is stated to be designed for use in a shower bath, may not, when enlarged, be exactly adapted to handle a large flow of water, but it is not seen to have required invention to make changes in the valve structure such as putting the openings closer to the partition of the valve seat or to form an opening in the valve itself to control the flow of the water through the openings of the valve seat.

Generically the control of the flow of the water in the device of the application is the same as in others of the patents.

Stress is by appellants laid upon the testimony of the witness who had been in the employment of the Leonard Company for a long time and assisted Mr. Leonard in his development, that the first thing the latter did, when he was asked to make the larger size valve, was to try to build it with the parts approximately as those of the patent, except larger, but it would not work.

The testimony gives no more definite statement than that as to what was done or why the model which was made did not work, so there is only the general statement of the witness to show it as not satisfactory.

As pointed out by the examiner the Leonard patent discloses the tubular valve seat with the tubular valve member moved over it by the action of the thermostat.

It would seem to be nothing but a matter of experimentation to make the openings in the two tubular members of the right size to handle the desired amount of water. As to the location of the thermostat with reference to the stream of water, that is clearly shown in the Johnson patent and it is submitted that, in view of that disclosure, there was no invention in putting a recess in the casing of the Leonard patent so that the heavy stream would not be directly against the thermostatic member. It would seem to have been obvious that it would be desirable not to have the thermostat so located.

Appellants seem to stress the fact that the involved claims do not read exactly on a single one of the references. That is to say that the specific form of the device has some novelty. But the question here is not one of novelty, but whether it required invention to make the claimed structure.

Mere novelty is not sufficient to establish patentability, but it must be shown that invention is present (see *Magnaflux Corp.* v. *Coe,* 78 U. S. App. D. C. 258, 139 F (2d) 531).

The finding of the Patent Office, sustained by the finding of the District Court, that neither claim 11 nor claim 12 defines invention over the prior patents of record, is presumptively correct, and it is submitted that the record is not such as to overcome that presumption.

CONCLUSION

It is submitted that the case was correctly decided in the District Court and that decision should be affirmed.

Respectfully submitted.

W. W. Cochran,
Solicitor, United States Patent Office,
Attorney for Appellee.

R. F. Whitehead,
Of Counsel.

December 1944.

U. S. GOVERNMENT PRINTING OFFICE: 1944